DATA USE IN SECONDARY SCHOOLS

Dissertation presented to the Institute of Education, Dublin City University in fulfilment of the requirements for the award of Doctor of Education (Ed.D.)

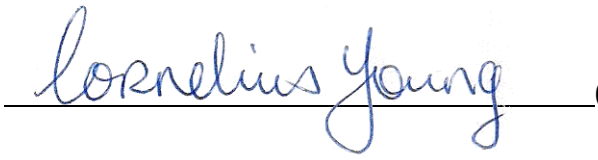
By
Cornelius Gerard Young
B.Tech. (Ed.), M.Sc., P.G.D.E.

Supervisor: Professor Gerry McNamara
School of Policy & Practice
DCU Institute of Education

December 2016

Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Education is entirely my own work, and that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

Signed:  (Conrelius Young)

ID No.: 12211607 Date: 19th December 2016

Acknowledgements

This thesis is dedicated to my parents, who taught me the values that now guide my life, who inspired in me to love learning and developed my determination to pursue my aspirations. They are always there when I need them. I would like to thank my dear friends, Gaye and Maria, without whom I would not have embarked on this odyssey. Thank you for your kindness, support, encouragement and friendship. Thank you Gaye for your insight, your attention to detail and always being there when I needed assistance. In a similar vein, I am extremely grateful to my good friends, Martin and Anne, to whom I deferred and received wonderful advice. I wish to express my appreciation to Prof. Gerry McNamara for his advice and encouragement during the whole doctoral programme. I would like to thank my family, friends and colleagues for their patience and support over the period that I have been working on this thesis. I am also indebted to the outstanding principals and teachers with whom I had the pleasure of working with during this research. Without their co-operation, openness and honesty, I would never have been able to complete this research. Not only are they leaders in their respective organisations they are leading the way in the field of data use in secondary schools in Ireland.

Table of Contents

List of Tables

List of Figures

Abbreviations

BOM	Board of Management
DEIS	Delivering Equality of Opportunity in Schools
DES	Department of Education and Skills
CAT	Cognitive Ability Test (version 4e in current use)
CPD	Continuous Professional Development
ERC	Education Research Centre
ETB	Education and Training Board
JCSA	Junior Cycle Student Award (Revised Junior Cycle)
LAOS	Looking at Our Schools (A resource self-evaluation in schools)
MIS	Management Information System
NBSS	National Behaviour Support Service
NCCA	National Council for Curriculum and Assessment
NCSE	National Council for Special Education
OECD	The Organisation for Economic Co-operation and Development
PDST	Professional Development Service for Teachers
P-POD	Post-Primary Online Database
SEC	State Examinations Commission
SEN	Special Educational Needs
SSE	School Self-Evaluation
TALIS	Teaching and Learning International Survey (from OECD)
TIMSS	Trends in International Mathematics and Science Study
TUSLA	Child and family agency
LA	Learning Analytics
VLE	Virtual Learning Environment

Abstract

Data Use in Secondary Schools **Cornelius Young**

Data Informed Decision Making (DIDM) has received considerable attention in education systems internationally due to increasing demands for school accountability and as a strategy to improve student outcomes (Schildkamp et al., 2013a). The pervasive nature of data available in schools appears to obscure fundamental consideration of what data schools find most valuable and what data based practices teachers and leaders engage in (Lawn and Ozga, 2009). Research indicates school leader's attention is often on overall organisational performance while teachers focus more on student performance in class (Schildkamp et al., 2013b). Data use is enabled or constrained by certain school organisational and contextual conditions such as the nature of the data, leadership and school organisation (Schildkamp et al., 2013a).

There has been very little research on this phenomena in Irish schools and this research investigated the type of data used and how they are used in seven schools identified as proficient in the use of data. There was a propensity to view the concept of data use, primarily in terms of assessment data to the exclusion of other forms, however, while state examination data was dominating impetus, routine classroom assessment received comparatively little attention. Similar to the international literature, principal leadership was the most influential factor contributing to data use in these Case Study schools. This involved building a shared vision, fostering a collaborative culture, distributing leadership responsibilities and creating an environment conducive to data use. While most of the principals were highly technically competent, there were deficiencies in the assessment and data capacities of the staff in general. There is considerable scope, therefore, to integrate data use further into the organisational culture of the schools and especially, increase the formative use of student learning data in teachers practice.

Chapter 1

Introduction

1.1. Introduction and background

> A decade ago, it was disconcertingly easy to find education leaders who dismissed student achievement data and systematic research as having only limited utility when it came to improving schools or school systems. Today, we have come full circle. It is hard to attend an education conference or read an education magazine without encountering broad claims for data-based decision making and research-based practice (Hess, 2008, p.12).

Educators routinely make decisions with the best intentions, inevitably however, 'decisions based on informed intuition, personal experience or anecdotal evidence' (Ingram et al., 2004, p.1260) can lead to unintended consequences. Whilst endeavouring to make the optimum decision, much evidence exists to indicate that practitioners settle for 'satisficing' solutions rather than finding the best one (Hoy and Miskel, 2008, p.325). This is often as a result of the intricate social environment 'characterised by ambiguity, uncertainty and disorder' (Owens, 2004, p.299) that we work in. The theme of this study, therefore, is about making the best decisions based on the best available evidence using the best possible approaches.

The concept of data-informed decision making (DIDM), a term used interchangeably with data-driven decision making (DDDM) and data-based decision making (DBDM), is relatively new to Irish education and school planning processes. Obviously, making decisions has always been an integral part of leadership and school development, however, in the current era of globalised education reform and increased accountability, school leaders are being held more responsible for creating self-sustaining, collaborative and evidence based organisations. The stakes are becoming increasingly high for schools, as a growing number of jurisdictions are enacting legislation that require various types of evidence to be incorporated into accountability and school improvement decisions (Hallinger, 2010). The No Child Left Behind (NCLB) legislation in the United States (Bush, 2001) added considerable impetus to the educational accountability agenda and further propelled expectations on the system to use data in decision making (Darling - Hammond, 2007, Schildkamp and Kuiper, 2010, Spillane, 2012). Consequently, Data-Informed Decision Making has become a central focus of education policy and practice in the United States, England (MacBeath, 2009), the Netherlands (Schildkamp and Kuiper, 2010) and elsewhere (Schildkamp et al., 2013a, Parveva et al., 2009, Picciano, 2006, Lange, 1988).

The requirement to integrate assessment data into school planning emerged in Ireland with the publication of the National Strategy to Improve Literacy and Numeracy (DES, 2011a). Arising

from that policy and the School Self-evaluation Guidelines (DES, 2011b) schools have to use a variety of data, such as standardised test results, in setting and reporting annual improvement targets (DES, 2012). 'Collecting and analysing data to build evidence on which to base evaluation judgements' has not been a feature of the Irish education system (McNamara and O'Hara, 2008, p.97), hence, Ireland is coming to this process later than several other counties.

According to Killion and Bellamy (200) 'Understanding and using data about school and student performance are fundamental to improving schools. Without analysing and discussing data, schools are unlikely to identify and solve the problems that need attention, identify appropriate interventions to solve those problems, to know how they are progressing' (p27). Data may be used for accountability through self-evaluation as well as to improve instruction and enhance school development by changing practices and monitoring effectiveness (Ingram, Louis and Schroeder, 2004). Used well, several researchers have shown how data can lead to school improvement in terms of increased student achievement (Park and Datnow, 2009, Schildkamp and Kuiper, 2010, Wayman and Stringfield, 2006). Data are essentially facts and statistics, not as valuable in insolation, and are only become useable after analysis, interpretation and judgement. Data-informed Decision Making describes the process of converting data into worthwhile information by adding meaning and through 'contextualising, categorising, calculating, correcting, and condensing the data' (Tan et al., 2009, p.7). Data-informed decision making is 'an interactive, multifaceted, and contextual practice within the school organisation' (Luo, 2008, p.610).

1.2. Data

School data is usually described as factual information. This may be measures such as scores on in-house or state examinations, standardised test results, benchmark tests or teacher generated class assessments. It may include attendance records, retention rates, disciplinary information and similar figures relating to student achievement. Other data that schools compile include demographic data on students including family circumstances, dates of birth, primary school attended and special educational need. These are often seen as 'hard data', often quantitative and regarded as definitive. One of the significant changes in recent years, frequently prompted by a search to hear stakeholder voices (Kennedy and Datnow, 2010), is the compilation of perception data; what parents, students and teachers think about the school and what it offers. Schools have, in fact, access to countless sources of data but availability does not ensure educators are able to use data effectively in school improvement planning or

to enhance student achievement (Anderson et al., 2010, Yoon, 2016). Narrow definitions of data have, not only lead to important information being ignored, but has led to misuse and misunderstandings. As a result some teachers view test data with suspicion and prefer to rely on their own anecdotal observations and intuition when making decisions about students and the curriculum (Schildkamp et al., 2013b).

1.3. Leadership

Much of the education reforms over the past twenty years have devolved more autonomy and management responsibilities to schools while simultaneously increasing accountability for improvements. Meanwhile, as it is principals who are tasked with implementing these reforms, research on school leadership is consistently emphasising the critical role played by principals (Leithwood and Day, 2007, Starratt, 2005, MacBeath and Mortimore, 2001). Leithwood et al. (2008) posit that Leadership is the second most influential factor to contribute to what students learn across schools. This impact is often indirect and mediated through teachers (Hallinger and Heck, 1996, Leithwood and Day, 2007, Leithwood et al., 2004). Principals, therefore, influence learning mainly by building a shared vision, collaborative culture, distributing leadership responsibilities and creating an atmosphere of a learning community (Hargreaves and Fink, 2012).

Data driven leadership is critical in transforming schools into communities of learners. The role of an effective data-informed leader includes collecting useful data, facilitating professional development on data use, analysing school practices in light of the data, establishing organisational goals and restructuring the organisation through evidence bases practices and a collegial culture (Datnow et al., 2007). This requires an understanding of the technological tools available, a capacity to organise ideas based on evidence and an ability to turn them into meaningful action (Knapp et al., 2006). The focus of school leader's attention is often on teacher and overall organisational performance while teachers focus more on student performance in class (Schildkamp et al., 2013b). In formulating organisation and overall student performance goals, it is vital to involve teachers in establishing a shared vision that involves effective use of data (Earl and Katz, 2006, Wayman et al., 2012c). By giving teachers and data experts the autonomy to make decisions involving data, school leader's increase the motivation and commitment of the whole staff (Datnow et al., 2013). Principals must organise activities and allocate adequate time to collaborate on analysing and implementing any proposed reform (Marsh et al., 2006).

It is important that the leaders themselves are data literate, that is they are able to devise goals for using data, can check the quality, are knowledgeable about analysis and interpretation and can monitor and report on the outcomes (Earl and Katz, 2006). This may extend to training and working closely with staff, making sense of student data, observing classes and proposing instructional strategies. The school leader should be an enthusiastic role model for the use of data, so teachers can recognise what is expected of them and feel comfortable engaging in with data (Datnow et al., 2013).

1.4. Teacher use

Teachers spend a considerable amount of their time assessing and reporting on students work but a number of researchers have queried the analysis performed and its value in decision making (see Mandinach and Gummer, 2016, Means et al., 2010). Researchers, such as DuFour (2004) describe schools as data rich but information poor to intimate that, although, valuable information is available, the full benefits are not being extracted from its use. Mokhtari et al. (2007) found, while 'educators spend significant amounts of time collecting assessment data, they do not take time or perhaps know how to organise and use data consistently and efficiently in instructional decision making' (p.354). Used well; exam results, homework, classroom observations, assignments, projects and portfolios can provide teachers with a range of information on what and how students are learning and identify discrepancies between groups (Schildkamp et al., 2012a). By continually monitoring the impact of their practices, teachers can identify if student achievement goals are being met and problems solved (Earl and Katz, 2006). Teachers can use data to improve their instruction by setting learning goals, clarifying the standards required, identifying gaps in understanding and skills among students, providing evidenced-based direction on how to improve and tailoring instruction to meet the individual needs of students (Hattie, 2009, Black and Wiliam, 1998, Stiggins, 2007). Spillane (2012) and Datnow et al. (2013) describe how student achievement data can be used to standardise, measure and guide instructional decisions as well as monitoring progress and proposing solutions to problems. Such information can be used to group students or areas of the curriculum that need attention (Young, 2006). Teacher data can be used to monitor and evaluate the curricular provision, share teaching practices, refine instructional strategies as well as form a basis for professional development and self-evaluation. Student examination data can also be used to motivate both teachers and students to improve (Diamond and Spillane, 2004).

1.5. Organisational use

The School Self-evaluation Guidelines for Post-primary schools (DES, 2011b) places much greater emphasis on gathering and use of evidence, on target setting and on consultation with the education partners than was the case heretofore. Several authors have also written on the significance of data in relation to decision-making in the context of school self-evaluation and improvement (Earl and Katz, 2006, Matthews and Lewis, 2009, Bernhardt, 2013, Schildkamp and Visscher, 2014, MacBeath, 1999). Analysing school data, such as student attainment scores, can be a 'tin opener' with which to explore the inner life of the school (MacBeath, 2013). Longitudinal data, for example, allow schools monitor trends in student progress over time, providing key information on the effectiveness of teaching strategies and curricular programmes. Longitudinal data can help improve planning by identifying where students are in their programme in relation to comparable students in previous years, help form performance benchmarks or targets and enhance schemes of work. Tracking student performance for school improvement relies on accurate and accessible information.

Management Information Systems (MIS) provide schools with an effective means to manage all sorts of school data. Several studies describe how schools use MIS data to plan and develop policies, set priorities and goals, plan assessment processes, devise calendars and inform annual reports (Shah, 2014, Coburn and Talbert, 2006, Wayman et al., 2011, Romero and Ventura, 2007). Information may be scrutinised at school, teacher, class or student level. Computer programmes make it possible to disaggregate and organise information in order to identify groups and individuals who need special attention, draw conclusions about strengths and weaknesses, extract management information about the curricular programmes and present information in a variety of formats. Depending on the Management Information Systems, it can become a barrier or an enabler to effective data use (Wohlstetter et al., 2008). An overly complex system can make it difficult to gather, analysis and present the required data and access reliable, comprehendible and valid information (Schildkamp, 2007). Furthermore, educators can be overwhelmed by the sheer volume of data available, both on computer and available around the school (Coburn and Turner, 2011, Schildkamp and Kuiper, 2010, Wayman and Stringfield, 2006, Datnow et al., 2013).

Effective use of data requires the necessary knowledge, skills and disposition in order to gather, analyse and use data strategically (Park and Datnow, 2008, Schildkamp and Teddlie, 2008, Datnow and Park, 2009). The lack of knowledge and skills may alienate or intimidate teachers

and cause them to base their decisions solely on their intuition and experience (Fabry and Higgs, 1997). Some teachers may have strong faith in their own experience and, consequently, less confidence and commitment to using data (Ingram et al., 2004, Schildkamp and Kuiper, 2010, Datnow and Park, 2009). Others may balk at the perceived additional workload involved in coming to terms with the data or, perhaps, view it as the responsibility of management.

The way data informed decisions are made, the type of data used and for what purpose can also be significant factors. The manner in which data is presented to staff by management is critical to reducing anxiety and promoting engagement (Yoon, 2016). School leaders influence the situation by modelling effective use, determining what data teachers have access to and providing support and encouragement (Datnow and Park, 2009). For DIDM to be effective it is important that the school culture is open to scrutiny and is confident with self-enquiry (Nelson et al., 2015).

1.6. Chapter overview

Arising from a review of the literature (Schildkamp and Kuiper, 2010, Honig and Coburn, 2007, Kowalski and Lasley, 2009, Datnow et al., 2007) the framework used in this study examines the kinds of data available in schools, the purposes for which the data is used and factors influencing this use. This framework is based on the premise that different people may use the same information or a combination of information for different purposes. The study distinguishes the purposes of using data from the perspective of school leaders, teachers and the organisation as a whole.

Chapter two begins by examining how various forms of data used in schools may be categorised including particular references to Ireland. Four key themes arose from an examination of the literature which is relevant to the current situation in this country, they are (1) the nature of data used, (2) how principals use data, (3) how teachers use data and (4) organisational factors in data use. These provide a framework under which this research was conducted and the dissertation is structured.

Chapter three details a rationale and explanation of the methodologies used in this study. The chapter describes the philosophy underpinning this research and how this is manifest in the methods employed. The chapter describes the use of Case Study and the factors that influence the data gathering methods used. The chapter outlines the process involved in conducting the

individual interview and focus group interviews, observations and review of documentation which are used as the methods to gather the information.

Chapter four provides a critique of the information gathered from the seven schools in this Case Study. The findings from the schools are presented under the themes of the data used, the principals use data, teachers use and the organisational factors involved. Responses are compared and contrasted and integrated with critical points from the literature.

Chapter five analyses and interprets the significance of the findings in light of the literature and the experiences in the Case Study schools. The key issues that emerged both from the literature and the findings from the schools are discussed in detail. Based on the analysis of the findings, a range of recommendations are proposed for the short-term, at national and local levels. Finally a number of suggestions are made to further research that may be conducted in this area, both at a system and a school level.

Chapter 2

Literature Review

2.1. Introduction

This chapter reviews the literature on what data is used in school contexts and how it is used for planning and improvement purposes. This chapter begins with a review of the epistemological considerations and different types of data available to schools. The review then turns to the use of data, starting with the concept of Data Informed Decision Making (DIDM) and a brief introduction to the situation in relation to Ireland. The study then focuses on school leaders' use of data and their influence in promoting a data-rich culture. The organisational influences on data use are then explored to examine the type of environments that facilitate effective use. The types of data and range of data-based practices teachers engage in to support teaching and learning are then examined. Finally, a number of ethical issues are considered.

2.2. Data used in schools

2.2.1. Epistemological foundations

Traditionally, the positivist 'scientific' research paradigm which emphasises objectivity and experimentation has been the most respected form of education research (see Cohen et al., 2013). Thus, it is verifiable, empirical evidence that is held in highest regards and often used to support theories or hypotheses, ideally involving controlled quantitative studies (Cartwright, 2011, Julnes and Rog, 2009). This approach has been criticised, however, because human behaviour is viewed as passive and controlled by the environment and, therefore, motives, individualism and free will are not considered (see Guba and Lincoln, 1994, Cohen et al., 2013). Alternative paradigms emerged that focus on the social reality, viewed and interpreted by the subjects themselves according to their own ideological predisposition. Knowledge, in these instances, is personally experienced rather than observed or interpreted from outside. The functional psychology movement (Dewey, 1997) based their theories on these philosophies and began to place emphasis on the practical action based on conscious experience. For example, Argyris and Schon (1974), Kolb and Fry (1974) and Schön (1983) promoted ideas of learning through reflection on experience. Consequently, these constructs have practical applications in schools when teachers, individually or collectively, draw on their experience and theoretical knowledge about learning to improve their practice. Whitehurst (2007) (cited in Kowalski and Lasley, 2009) further describes this intuitive dimension of educationalist's practice as 'professional wisdom' ie: the instinctive dispositions that guide their behaviours. This marks

an evolution in what is regarded as valuable in education research from an episodic, external, experimentally orientated towards a more constructive, practical and routine practice in classrooms. In parallel, there has also been a growing interest in evidence-based policy and practice, and the myriad of related adjectives, such as; data-based…, research-based…, and scientifically based... (Shahjahan, 2011) decision making in education. To adequately address the complexities, educators are challenged to find ways of investigating that embrace the multidimensional nature of schooling. This has resulted in the use of variety of research methods rather than sticking too rigidly to either quantitative or qualitative approaches (Creswell, 2012a, Cohen et al., 2013). The paradigm wars that historically permeated academic research in education have now largely been silenced by the need to take a pragmatic approach which most appropriately answers the questions on hand (Halcomb and Hickman, 2015, Cohen et al., 2013). These considerations are reflected in the types of data collected, the process of analysis, the presentation of findings and evaluation following implementation.

2.2.2. Choosing data

The use of evidence is not new to schools (see Hunter-Carsch, 2006), often deciphering the most appropriate data to use, however, is more of a challenge. In fact, Wilhelm (2011) and Wayman (2005) describe schools as data rich but information poor. Moreover, although, the range of data available to schools is extensive, according to Wayman and Stringfield (2003), it is rarely used effectively. In fact, Schmoker (2003) and Lachat and Smith (2005) argue there is often too much data, but not the right type, or not in a format that facilitates use. Data Informed Decision Making (DIDM) processes involve making value judgements, right from the beginning because, selecting appropriate data, who collects it and how, have a significant bearing on the data used afterwards. Research by Lachat and Smith (2004) illustrates that the types of data collected has a significant bearing on the types of decisions made. Outcomes also vary widely depending on how the particular type of data are analysed, the technology involved, the rigor applied and the assumptions made about the data. Whereas these series of activities are very complex in their own right, leadership and organisation culture are two further variables that play a significant role on how practitioners turn what has been ascertained into action (see Schmoker, 2003, Lachat and Smith, 2005, Wayman et al., 2012c, Louis et al., 2010). Despite having a significant impact, through the whole process from data gathering, analysis, decision making and implementation, those involved may not be aware of or fully appreciate the significance of the value judgements or biases involved.

2.2.3. Intuition versus data use

Data, in and of itself, are just numbers, text, graphics etc.: they only become powerful when educators apply their knowledge, skills and experience to implement actions based on data to serve the needs of the school. Effective data users, not only know how to use the data available but know when to challenge and transcend research findings. There is a conflict among many educators, however, between the significance placed on scientifically based approaches and anecdotal evidence influenced by instinct, emotion and perception (Earl and Katz, 2006, Young and Kim, 2010, Kowalski et al., 2008). Many teachers argue that the latter are the very characteristics of an instinctive teacher and the rise in evidence based approaches is based on mistrust of teachers and is professionally demeaning (Saunders, 2000). Altrichter and Posch (2014) describe the apparent contradictory policy messages sent to schools; teachers are expected to take the initiative and innovate instruction to cope with increasingly diverse and complex challenges in the classroom. On the other hand, there is a tendency to restrict their scope for action by imposing, supposedly quicker system measures, such as performance standards and external evaluation, thus, increasing controls on teaching practice (ibid). Similarly, McNamara and O'Hara (2006) describe teachers objections to 'reductionist and managerialist interference in their professional autonomy' (p.565). Initial considerations on the use of data, therefore, often involve friction between reforms promoting transparency and professional intuition, as well as, the extent to which data contributes to enhanced teaching and learning or increases accountability.

2.2.4. Defining datasets in education

Hargreaves (1997) (cited in Kowalski and Lasley, 2009) describes evidence in education as information that verifies effective practice. Mandinach and Jackson (2012), define Data Informed Decision Making as 'The process by which an individual collects, examines, and interprets empirical evidence to make a decision' (p.27) whereas Schildkamp et al (2012) puts this, specifically, in an educational context; 'information that is collected and organised to represent some aspect of schools' (p.10). Evidence may include a variety of sources such as examination performance, classroom observation of teaching or the opinions of parents taken from surveys. In comparison to these broad descriptions, in high-stakes testing environments, the principle evidence is often reduced to numerical conjectures of quality, including but not limited to terminal examinations and standardised test results.

Ignoring the broader context within which student achievement occurs limits the improvement capacity of data informed processes (Bernhardt, 2013, Holcomb, 1999, Johnson, 2002); 'data without context or analysis simply will not take you anywhere' (Kowalski et al., 2008, p.104). Indeed, Hattie (2009), amongst others (see He and Tymms, 2014, Nor, 2014, Ray, 2006), identify the multifactorial influences on achievement; including personal, home, school, curricula, teacher characteristics and teaching strategies. Many studies, for example: Creighton (2006), Lachat and Smith (2005), Hamilton et al. (2009) have broadened the perspective on student achievement to the extent that attainment is decreasingly considered in isolation. Although these studies provide a multidimensional perspective on student attainment, they do not consider the other vast range of organisational school data that may be relevant (such as leadership and school culture), let alone the interconnectedness between various forms of data. The vast array of data that may be relevant in these scenarios, not only complicates the conception of educational data, but makes coming to terms with the practical implications more complex. A number of authors (see Coburn and Turner, 2011, Ikemoto and Marsh, 2007, Lai and Schildkamp, 2013, Gill et al., 2014, Marsh, 2012, Schildkamp and Kuiper, 2010, Schildkamp et al., 2015, Schildkamp et al., 2012b) have endeavoured to produce a manageable taxonomy of data in educational environments: the following is a critique of the most prominent found in the literature.

Bernhardt (2013) proposed the collection of four types of data (see Appendix I):

- Demographic data: which provides descriptive background information on students, staff and the school
- School process data: descriptions of what teachers are doing to get the results they are getting
- Student learning data: descriptions of student performance
- Perception data: descriptions of what people think about the learning environment (p.17).

She not only considered these types of data from a longitudinal perspective, but also examined the relationship between several streams of data.

Celio and Harvey (2005) proposed a simpler model involving seven indicators:

- Student achievement in reading and mathematics

- Achievement gaps between subgroups of students
- Student attraction to the school
- Student engagement (through attendance, punctuality and involvement in activities)
- Student retention/completion
- Teacher attraction and retention to the school
- Funding equity (p8)

Koretz (2003) examined data in terms of cognitive outcomes, non-cognitive outcomes (e.g., attendance and dropout rates) and educational practices in schools (such as teaching strategies). Marsh et al. (2006) further offered a conceptual framework to identify multiple types of data under the heading of input, output and process data:

- Input data, such as student demographics and school expenditure
- Process data, such as instructional, operational and financial data
- Outcome data, such as dropout rates, student test scores, and satisfaction data (p1)

Based on categories such as these, Schildkamp and Kuiper (2010) argue that, depending on their roles and responsibilities, different personnel in a school need different types of information. Teachers, for example, need information on the learning strengths and weaknesses of individual students while school leaders require information about the overall progress of groups of students and progress measures of school effectiveness. A distinction, therefore, is made between data primarily used for organisational purposes and data used for teaching and learning. Schildkamp et al. (2012a) propose a conceptual framework for data, similar to Marsh et al. (2006), categorised by Input, Process and Output but added Context.

- Context data: policies, resources, school culture, discipline, infrastructure
- Input data: teacher and student demographics, attendance, socio-economic status
- Process: the quality of instruction, management and assessment practices
- Outcome: Student assessment results and well-being information

There is, therefore, a dilemma in selecting data; considering data in broad terms may result in large, complex datasets and prioritising certain forms of data, will almost inevitably ignore potentially important contributing factors, such as home background. Indeed, most authors advise against viewing these categories in isolation and emphasise the interconnectedness between the factors (Bernhardt, 2013, Marsh et al., 2006). Using multiple measures also

stimulates schools to improve a broader set of goals and reduces the potential to engage in strategic behaviours that can distort the data (Ehren and Swanborn, 2012). 'In effective schools, both quantitative and qualitative data and summative and formative measures inform critical decisions' (Kowalski et al., 2008, p.226) and using more than one indicator also improves the validity and reliability of judgements.

2.2.5. Assessment data

In some jurisdictions, such as the United States, the overwhelming influence of high-stakes testing has led to a significant emphasis on quantitative test data, teaching to the test and narrowing the curriculum (Rosenkvist, 2010, Hout and Elliott, 2011, Morris, 2011). Often this perspective is reinforced by the value placed on such tests by politicians, researchers and the media (Schildkamp et al., 2012b). According to Erskine (2014) this has detracted from the quality of teaching, formative information and broader learning outcomes that are crucial for life-long learning and enjoyment of learning. Slavin (2002, 2003) is of the view that an overemphasis on testing for accountability has made many teachers sceptical of using data, leading them to depend on their intuition over valuable information about student learning.

Given the international emphasis on accountability and benchmarking in education and the significance placed on standardised tests and terminal examinations, it is not surprising that student attainment data would be pre-eminent for planning. In some systems, schools are categorised and ranked primarily by this measure of quality and tests results can have serious repercussions (Rosenkvist, 2010, Morris, 2011). Heritage and Yeargley (2005) distinguish between four types of assessment data, all of which have a role in decision making:

- Large-scale standardised achievement tests based on a normative curve
- Benchmark assessments that measure student progress toward mastery of the standards
- Teacher graded assessments as a measure of student learning
- Formative assessments used by teachers to inform adjustments in their instruction

2.3. Data in Irish schools

2.3.1. Limited availability of data

There is relatively little statistical data about the Irish education system as a whole and, currently, there is very little data regarding the standardised ability of students at second level, with which comparisons can be made (McNamara and O'Hara, 2012). These authors continue on to question the system's ability to generate appropriate data for school self-evaluation due to capacity issues, while the Chief Inspector claimed the lack of a data capture system is the result of insufficient government investment (Hislop, 2013, O'Brien et al., 2015). Gilleece (2014) found considerable limitations to the datasets available on the Irish education (for example; standardised student achievements, population profiles, student backgrounds); most use samples of the student population only, longitudinal data is sparse and most of this data is irreconcilable, for example with state examinations data. In fact one of the benefits of involvement in international studies, such as PISA and TALIS, is that in addition to gathering measures of achievement, the reports gather detailed background information from students and principals (Gilleece, 2014). In the absence of the coordinated data systems found elsewhere (Nayir and McNamara, 2014), below describes a range of data that should be available in most post-primary schools.

Data Set	Description
P-Pod (DES, 2016)	P-POD is the computerised system used by schools to submit annual reports to the Department of Education (see DES, 2016d and Appendix II).
Standardised Tests	Standardised testing has been carried out in primary schools since 2007 and there are plans to implement standardised tests in English, Maths and Science for Second Year students from 2017 (Brown et al., 2016). Primary schools are required to send the results for the standardised test they conduct to parents, the Department of Education and to appropriate secondary schools for each sixth class student (DES, 2016b).
TUSLA Returns	Schools are required to maintain and submit a report on levels of school attendance to TUSLA detailing behavioural issues,

	suspensions and expulsions. Schools are also required to produce plans and targets to improve attendance (see TUSLA, 2016).
SEN Data	Schools should have records of students with special educational needs including details of resources including teacher allocation, educational plans and psychological reports (DES, 2014).
DEIS Reports	Schools that are part of the Delivering Equality of Opportunity in Schools (DEIS) scheme are required to produce three-year improvement plans, including targets, under the themes of Literacy, Numeracy, Examination Attainment, Attendance, Retention, Progression and Partnership with parents and others (see Smyth et al., 2015, DES, 2005).
School, Subject Department and Lesson Planning Documents	Schools should have a range of whole school and subject planning documents (see The Inspectorate, 2013 and Appendix III for a list of required school policies).
Inspection Reports	Schools have been subject to examination from DES Inspectorate for over 10 years and should have a range of reports detailing good practice and recommendations. These reports may be: • Whole School Evaluations • Subject inspections • Programme evaluations • Specialised or thematic inspections • Inspection of probationary teachers • Incidental (unannounced) inspections • Follow-Through Inspections (see The Inspectorate, 2016)

School Self-evaluation Reports and Improvement Plans	Since 2012 schools are expected to conduct a self-evaluation review on Teaching and Learning and develop 3 year Improvement Plans (see DES, 2011b, DES, 2012, DES, 2016c).
Examination Data	Summaries of their student's performance in state examinations would be available in schools with a significant number comparing these results to national averages (see SEC, 2016, PDST, 2016).

Table 1 Categories of data available in post-primary schools

2.4. Origins of Data Informed Decision Marking (DIDM)

2.4.1. Increasing emphasis on Data Informed Decision Marking in Ireland

Arising from greater international emphasis on accountability systems, school leaders and teachers are increasingly required to demonstrate how evidence is used as a basis for their decisions (Sahlberg, 2011, Lingard and Lewis, 2016). Ireland, amongst other countries, is coming to this perspective much later than countries such as the USA and UK who have well established practices and technological systems to gather, analyse and use internal school based and national data. As McNamara and O'Hara (2005, 2006, 2008) and the OECD (2010) point out early on, there was an absence of national data in the Irish education system. Furthermore, according to (OECD, 2009), Irish teacher's decisions about pedagogy, curricular content and student progression tend to be based on intuition and instinct rather than on assessment data. Similarly, the Chief Inspectors, stated that 'the Irish school system has considerable work to do to improve the information that we have available to us regarding the effectiveness of individual schools and the system more generally' (Hislop, 2012, p.19). Although the roll out of School Self-evaluation Guidelines (DES, 2011b) increased the pressure to gather various forms of evidence, this focus on analysis and use of data involves a considerable culture change for many schools. According to McNamara and O'Hara (2006), the density of the previous LAOS framework (DES, 2003), ambiguity about the use of data and uncertainty about contributions from stake holders were among the reasons self-evaluation did not take hold previously. The 2012 SSE guidelines (DES, 2011b) are focused on Teaching and Learning alone and are more specific with a clearly delineated process. They are, however, also more prescriptive in terms of the frequency of cycles, structure, evaluation criteria and requirements

for evidence, consultation and target setting. The current converging trends in accountability, technology and school self-evaluation are creating new possibilities to attain a deeper level of understanding about the complexities of school leadership, teaching and learning with much of this being illumined by data.

2.4.2. Rationale for Data Informed Decision Making

The fundamental premise of DIDM is the examination of school data to better understand underlying issues and inform actionable knowledge to improve learning (Love, 2009). There is a considerable body of evidence in the literature about the benefits of data informed decisions (Datnow and Hubbard, 2016, Datnow et al., 2007, Schildkamp and Kuiper, 2010, Honig and Coburn, 2007, Wayman and Stringfield, 2006, Kowalski and Lasley, 2009, Marsh et al., 2006, Mandinach and Gummer, 2016). Several types of information gathered in schools, such as assessment data, are no longer solely used for internal reviews or reporting purposes but are significant features in accountability and school improvement systems. Lingard and Lewis (2016, p.388) trace the spread of the top-down, test-based mode of accountability developed in the USA and UK in the 1980s to 'infecting' the international schooling systems through, what Sahlberg (2011) describes as; the Global Educational Reform Movement (GERM). The measures include; high-stakes testing; educational accountability based on testing; national curricula; an emphasis on literacy and numeracy standards; new managerialism; marketization, privatisation and policies of choice and competition between schools which act as putative means to drive up standards (Sahlberg, 2011). The increased ways schools are held accountable has led to both greater demands for information about school performance and greater scrutiny of educational programmes (MacBeath, 2009, Schildkamp and Kuiper, 2010, Spillane, 2012).

Where the correct conditions are created and data is contextualised, analysed and interpreted effectively then it becomes consequential information and valuable in action planning. Earl and Katz (2006) state 'data can offer a vehicle for investigating tacit knowledge, to refine and even transform it, as it is converted into explicit knowledge for use in making decisions'(p.21). Discussions on data use help guide teachers in setting goals, provide supportive raw materials and encourage collaboration. In jurisdictions where it has been long established, the focus of Data Informed Decision Making is beginning to move beyond primarily accountability purposes and has evolved into enquiry based cultures (Mandinach and Gummer, 2016).

Basing decisions on data raises a number of issues including what data to use, for what purpose and what are the supportive and hindering conditions. Much of this will depend on the situation being addressed; teachers need formative information which improves learning in the classroom whereas school leaders need more summative information for comparing student progression and attainment across the school and between schools (Schildkamp and Kuiper, 2010). Ireland is at the initial stages of integrating data into school planning in a strategic manner. In order to be successful, this will require the leadership and vision from the principal, organisational structures and an environment that make data use feasible and straightforward and, finally, it requires the support and engagement of staff.

2.4.3. Definition of Data Informed Decision Making

A variety of labels exist but the most prominent terms used currently are Data Driven Decision Making (DDDM) (see Ikemoto and Marsh, 2007, Kowalski et al., 2008), Data-based Decision Making (Mandinach and Gummer, 2016, Spillane, 2012, Schildkamp et al., 2012a, Wayman et al., 2006) and Data Informed Decision Making (Shen and Cooley, 2008, Knapp et al., 2006). These terms are often used inter-changeably in similar contexts and usually to describe guiding practice leading towards school improvement. In this study, Data Informed Decision Making is preferred.

Data in isolation is inconclusive, it is not until users apply concepts, criteria, theories of action and interpretive frames of reference that data makes sense (Knapp et al., 2006, Tan et al., 2009, Cousins and Leithwood, 1993, Schildkamp and Kuiper, 2010). The United States Department of Education defines DIDM as 'A process that integrates the analysis of educational data, typically stored in educational data systems, to support decisions intended to improve teaching and learning at the school and classroom levels' (Means et al., 2009, p55). Dunn et al. (2013) argue that data for decision making should involve 'examining systems and classroom practice in a systematic manner and creating the conditions for leaders and teachers to identify the areas of student need and areas where they as professionals require new learning to support enhanced student learning' (p156). As these definitions indicate, the conception of DIDM varies from broad, organisationally focused to narrowly student attainment centred, which has implications for the nature of the data considered. Data comprises of elements of information that, by themselves, are given meaning through the context in which they are perceived. The context, therefore, transforms data into information for decision making and ultimately the further

transformation into knowledge and actions (Mandinach and Gummer, 2016). In this study into data and its use in an Irish context, the broader conception is considered.

2.5. Leadership

Senge et al. (2012) described a leader's responsibility to help teachers achieve more accurate, insightful and more empowering views of reality. This conforms to a popular emerging view of leaders as coaches, guides or facilitators (Chapman, 2005). Furthermore, with this style of leadership, educators throughout the organisation are encouraged to exercise initiative and take on leadership roles. This allows people to see 'the big picture' and to appreciate the structural forces that influence behaviour. The notion of vision is critical here, because, without vision, there is no creative tension and leadership in any learning organisation should start with the principle of creative tension (Senge et al., 2012). This comes from seeing where one wants to be and accurately, openly and honestly diagnosing where educators are in terms of current situation – i.e. self-evaluating.

The literature repeatedly emphasises the pivotal role played by the principal in promoting DIDM (Wayman et al., 2012c, Louis et al., 2010, Lachat and Smith, 2005, Supovitz and Klein, 2003, Wayman et al., 2006). The manner in which principals exert their influence in leading school improvement under normal circumstances also apply to leading the use of data ie: cultivating shared goals and norms, developing human capacity, and modifying structures to create conditions to support student achievement (Wayman et al., 2012c, Park and Datnow, 2009, Leithwood and Riehl, 2003). Principals also ensure internal accountability through a combination of moral accountability (i.e. shared norms) and 'peer-enforced professional accountability' (Firestone and Riehl, 2005, p.97). Research by Lachat and Smith (2005) and Wayman et al. (2012c), demonstrated schools that effectively use data have leaders who are committed to data use and have developed a strong vision for their use within their schools. Copland (2003) and Park and Datnow (2009) found schools where leaders distributed responsibility in the use of data, used data more effectively and data was integrated into the operational systems of the school were more effective. Meanwhile, Deike (2009) found principals who worked collaboratively and acted as instructional leaders established clear norms for data use and were more likely to lead successful data initiatives.

2.5.1. Principal's use of data

Louis et al. (2010) found principals establish the purpose for, and expectations around, data use, as well as facilitating opportunities and time for working with data. Administrative leaders use data to understand patterns of performance, identify strengths and weaknesses so they can effectively allocate resources and plan professional development and other interventions. Instructional leaders, on the other hand, use data to inform and develop instructional practices (Luo, 2015). Other leadership characteristics that influence data use include setting clear goals and expectations, creating structured time for collaboration with data and fostering a collaborative environment (Wayman et al., 2012c). Levin et al., (2012, p. 185) describe actions in four key areas in principal's use of data:

- Formulating goals specific to the needs of the school
- Providing structures to support DIDM
- Building human and social capital
- Creating a climate of trust and collaboration and a culture of data use.

Wayman et al. (2012c, p.37) provided a comprehensive critique of leadership influences that impact on effective data use found in literature and may be summarised as follows:

- Ask the right questions: supporting staff to identify relevant problems and choosing appropriate actions
- Communication: clarifying how data are used among stakeholders
- Data system support: using MIS to its optimum to improve instructional decisions
- Distributing leadership: establishing structures and opportunities to develop knowledge and skills among staff in data processes
- Engaging in personal learning opportunities: improving leaders own knowledge and skills in data use
- Ensuring adequate professional learning opportunities: facilitating relevant professional development opportunities
- Facilitating collaboration around data: facilitating opportunities for teachers to collaborate with data
- Focus data on larger context: ensure a broad spectrum of relevant data is available and used

- Fostering common understandings: creating opportunities to develop a shared understanding of teaching, learning and data use.

These authors also found principals facilitated collaboration by (1) participating in collaboration with faculty around data; (2) structuring ways for faculty to collaborate around data and (3) setting expectations for collaboration (ibid). 'Principals distributed leadership in two distinct ways: either by relying on different support staff to work directly with teachers in their data use or by creating the opportunity for teachers to act as data 'leaders' on their campus' (Wayman et al., 2012c, p.20). Many of the structural requirements identified by Wayman already exist in the Irish system, e.g., school planning, MIS, opportunities to collaborate. Many of these practices may be accomplished with existing resources by establishing a clear vision for data use; developing knowledge, skills and practices for data and establishing a distributed, learning-focused leadership style. Similarly, Park and Datnow (2009, p.477) found it imperative that leaders co-construct the vision and implementation of DIDM by creating an ethos of continuous improvement rather than blame, empowering staff by distributing responsibility and using their expertise, and focusing on building capacity by modelling and 'knowledge brokering' among staff. On the other hand, Brickmore (2014) found principals in schools considered as failing, focused mainly on increasing test scores rather than improving the culture, dialogue and capacity for data use.

2.5.2. Principal's Data Literacy

Although Lachat and Smith (2005) found leadership to be the primary influence in school data use, they found few leaders had formal training in analysing and interpreting data for school improvement. They concluded that effective DIDM is more dependent on one's leadership competencies than their level of knowledge and skill with data (ibid). Reeves and Burt (2006), however, found principals' lack of expertise in using data effectively was a significant obstacle in progressing DIDM. Similarly, Luo (2008) found that knowledge and skills in data analysis to be one of the greatest influences in determining principals use of data. Principal's capacity in the use of data is critical but cannot be taken in isolation from broader leadership skills. Discussing the data skills required, Hamilton et al. (2009, p.47) used the term 'Data Literacy' which is the 'ability to ask and answer questions about collecting, analysing, and making sense of data'. Similarly, Earl and Katz (2006, p.19) contend that data literate leaders should be aware of how data can be used for different purposes, they need to be able to recognise sound and unsound data, to understand statistical and measurement concepts, to recognise various

forms of data (numbers, opinions, observations, etc.), to make interpretation paramount (rather than superficial quick fixes) and pay attention to reporting to different audiences. Without the knowledge of how to use data skilfully, leaders may misinterpret findings, misalign priorities and goals with the capacity of the school (teachers and students) or focus on evidence that is deficient or irrelevant (Vanover and Hodges, 2015). Using the term 'evidence-based leadership', Vanover and Hodges (2015) describe how leaders must be able to interpret and infer meaning from data, use that evidence to guide developments through collaborative action planning as well as support and monitor the improvement process. As principals' comfort and proficiency in data use appear to reflect their training (Mandinach and Gummer, 2013, Luo, 2015), it is imperative training is provided to principals on DIDM in areas such as research methods, statistics, analysis and MIS. The literature has identified promoting a culture of collaboration and enquiry as well as distributing leadership are critical success factors in the integration of data into decision making across the school organisation (see Levin et al., 2012, Wayman et al., 2012c, Mandinach and Jimerson, 2016).

2.5.3. Leading collaboration and enquiry

Earl and Katz (2006, p.20) refer to exercising leadership through fostering a 'culture of inquiry' where leaders involve others in interpreting data and everyone is seen as learners who can support each other's understanding. Wayman and Stringfield (2006) reiterate the significance of involving all the staff in data conversations because, as the ultimate consumers of data, their understanding is vital. It is the teachers who are the ultimate change agents in their classrooms and, therefore, fostering teacher collaboration enables teachers to explore issues and determine solutions through shared enquiry, reflection and dialogue. This may involve a profound change to the professional culture of a school to one where the principal models the enquiry practices and makes 'data a prominent feature of deliberation about the myriad issues that confront them on a daily basis' (Knapp et al., 2006, p.16). 'A principal who is data-driven can exert substantial influence on the faculty, communicating the importance and thereby stimulating use' (Mandinach et al., 2006, p.13). The leadership required to support a culture of enquiry may be direct through modelling data use or leading collaborative discussions, or indirect, through provision of resources, including time, or orientating discussions towards improvement outcomes, critical reflection and challenging existing practices (Nelson et al., 2015). If Collaborative Enquiry is the engine of professional learning, data provides the fuel (Katz and Dack, 2014).

Building a culture of collaborative enquiry involves tackling the assumption that teaching is an individual and autonomous rather than a collegial activity. Howley et al. (2009) describe how culturally responsive principals can mediate successfully between teachers cultural expectations and their own educational visions. This de-privatised way of working can create fear and uncertainty that needs to be balanced with a supportive, trusting and nurturing environment (Katz and Dack, 2014, Wayman and Stringfield, 2006, Farrell et al., 2015). Collaborative enquiry builds a sense of collective efficacy and shared beliefs and, developing such social and professional capital through collaboration, builds trust and professionalism among teachers (Sharratt and Planche, 2016).

2.5.4. Distributed Leadership

Working together with a common vision to improve student learning promotes collective responsibility and leads educators 'to notice, face and take on tasks of changing instruction as well as harnessing and mobilising the resources needed to support the transformation of teaching and learning' (Spillane et al., 2004, p.11). Spillane et al. (2004) and Copland (2003) found distributing leadership is essential for creating school structures conducive to data dialogue. Copland (2003) found that as data-based enquiry practices developed among staff, more responsibility was distributed and new teacher leadership skills emerged. Over time, various stakeholders take on co-leadership roles, exercising initiative and developing shared norms and expertise in data-informed decision making (Knapp et al., 2006). Such practice emphasises expertise over hierarchical structures, opening doors to sustainable, organisational and collaborative learning and subsequently freeing the principal for other leadership activities (Copland, 2003, Knapp et al., 2006, Spillane et al., 2004). Distributing leadership functions acknowledges and utilises the specialist expertise available and develops the organisation capacity through conversations about teaching and learning and the potential of data to inform decisions. Notwithstanding the benefits of a strong influential leader, considering ever increasing accountability demands and the complexity of instructional leadership, establishing multiple decision makers throughout the organisation and empowering them to participate fully in problem solving, innovation, and collaboration may be the critical solution to avoiding principal burn out (Young, 2006). Wayman et al. (2012c) found principals who successfully involve others in DIDM lead schools that are more effective at using data. They also found principals distribute leadership of data in two distinct ways: by relying on staff (positional leaders and those with specialist knowledge) to support teachers in their data use and by

creating opportunities for teachers to act as data leaders (individually or in groups). Often, however, this distribution of leadership is more akin to the distribution of work than leadership, consequently reducing the principal's workload (Wayman et al., 2012c).

2.6. Organisational Use

2.6.1. Professional Development

Building organisational capacity in the use of data can be extremely challenging, especially if there is suspicion and uncertainty behind the motives. Through strategic leadership, the establishment of a culture of enquiry, professional development and collaborative working practices, schools begin to develop structures in which DIDM is possible (Wayman et al., 2006, Katz and Dack, 2014). Mandinach et al. (2006) and Mandinach and Gummer (2016) found that, until recently, data analysis or DIDM processes were not part of teacher or principal training even though there was an expectation in some policy reforms that educators already have these skills. As training in DIDM is not typically part of training courses, teachers need support to develop the knowledge, skills, and dispositions required which has led to the growth of in-service professional development in many jurisdictions. In light of this gap in professional training, studies have shown that misinterpretations arising from difficulties understanding measurement procedures and assessment statistics, such as comparison across groups and years, are a concern (Mandinach and Jimerson, 2016, Means et al., 2010). Deike (2009) identified structured time for collaboration and professional development as two significant activities that provide cultural support and can motivate staff to use data. By ensuring quality time for collaboration with data, leaders enable teachers to build solid foundations for effective system-wide data use. Irrespective of supports and resources, the quality of data use is dependent on an educator's capacity to analyse and act appropriately on the data.

In order to be sustainable and effective, rather than being viewed in isolation, development of data skills needs to be integrated with teacher's content knowledge and pedagogical skills (Mandinach and Jimerson, 2016). This is especially important if data use is ever to be regarded as improvement rather than compliance orientated (ibid). There are, however, varying degrees of capacity required of data depending on use, for example, on leadership responsibility or specialism. Huffman and Kalnin (2003, p.6) recommend 'professional development should move beyond basic awareness and knowledge building, and help teachers actually translate

their knowledge into practice, encourage them to make innovations in their teaching, and to reflect deeply on teaching and learning'. Research findings indicate that training activities have a positive effect on educators' DIDM knowledge and skills (Schildkamp et al., 2015, Wayman, 2005, Staman et al., 2014). Wayman and Jimerson (2014) posit that collaboration, engagement, contextualisation, job-embedded, intensiveness and coherence are key features of professional learning with data. Research also indicates Continuous Professional Development (CPD) should involve collaboratively analysing both qualitative and quantitative data (such as assessment data, structured classroom observation data, and student and teacher interview data) to identify problems and propose solutions (Poortman et al., 2016, Mandinach and Jimerson, 2016). Walumbwa et al. (2007), for example, found teachers perceptions of internal assessments and standardised testing improved when they were supported by focused professional development. Data Coaching and Professional Learning Communities are two approaches that provide structures to data use and building capacity frequently cited in literature (Marsh et al., 2015).

2.6.2. Parent Voice

Although polices (see for example:DES, 2011b, DES, 2006, DES, 2012) frequently mention involvement of parents and students as partners, until recently, systematic consultation with parents and students about the quality of education they experienced was largely ignored in Ireland (McNamara and O'Hara, 2012). As a significant part of ongoing educational reform 'the inclusion of the voice of students and parents in school self-evaluation processes' have achieved new significance (DES, 2012, p.9). Justification for engagement with student and parent opinion may be seen along a continuum from accountability to educational improvement. This applies to the rationale for parent involvement in decision making, to the authenticity of the practices engaged in and the sentiments involved in the relationships between the stakeholders. In addition to supporting their children in their learning, parental engagement may extend to participation in school related activities and associations (Byrne and Smyth, 2010) as well as increasingly being asked for their opinions about the operation of the school through SSE. Research indicates that the degree of parental involvement reflects their socio-economic status, the educational achievement of mothers, and their attitude towards education, with poorer parents less likely to proactively engage with schools (Byrne and Smyth, 2010, Hanafin and Lynch, 2002). Hanafin and Lynch (2002) indicate that working class parents have been alienated from the educational debate and decision-making because of

cultural, linguistic and resource issues that make it difficult for them to participate. According to Lyons et al. (2003), parents from middle-class backgrounds have a more extensive understanding of schooling due to their own experiences, through social networks and their financial wherewithal. 'Parents who think that they can make a difference are motivated to get involved, while those who think that other factors and not them have the determining power prefer to keep their distance' (Georgiou and Tourva, 2007, p.480). Rather than being inclusive, schools often actually perpetuate this inequality through lack of awareness of the significance of language and cultural difference with working-class parents (Cregan, 2008). There is a danger, therefore, that the greatest demands for participation and most forthcoming information will be from socioeconomically advantaged parents and the opinions of socially and economically marginalised parents will be more difficult to ascertain.

2.6.3. Student Voice

The Department of Children and Youth Affairs report, 'Children and young people's experiences of participation in decision-making at home, in schools and in their communities', (Horgan et al., 2015) found most young people are dissatisfied with their level of input into school decision-making processes. The report highlighted that young people found the low status adults accorded their opinions as frustrating and unfair and, consequently, had poor expectations that their opinions would be sought for anything other than peripheral and insignificant issues. This is somewhat ironic as, in the same report, principals and teachers outlined their belief that structures, such as student councils, were effective in promoting students participation (ibid). de Róiste et al. (2012) found the level of participation by students in school decision making was relatively low with participation associated with students who like school, were perceived to be higher achievers, had higher life satisfaction and greater reported happiness. Student councils appear to be the main mechanism for students to contribute to school decision making, however, 'on matters more important to them, such as the location of school tours, uniform, curriculum, timetabling and school reports, there was limited evidence' young people were consulted (Horgan et al., 2015, p.81). 'Giving pupils a genuine voice requires some transfer of power and influence to them' (Harris, 2009, p.357), and authentic participation of young people in school decision making, is dependent on a cultural change on the part of adults, towards a children's rights-based approach (Horgan et al., 2015).

Student opinions or 'student voice' also offers teachers a potentially valuable resource for their teaching. Black and Wiliam (1998) describe the dividends of leading students in discussions about how they learn; it helps them to learn self-assessment, promotes reflection, increases content understanding as well as reorienting students thinking processes. 'As school personnel listen to students, they better understand how students learn, what students need, and how the organisation can help better respond' (Kennedy and Datnow, 2010, p.1251). This may involve a significant change in the teacher-student dynamic in many schools, so students are seen as legitimate partners and playing a key role in inquiring into and improving teacher practice. In such an environment teachers and students routinely reflect on and discuss learning outcomes, improvement plans, successes and failures and the learning is seen as a joint enterprise.

2.6.4. Management Information Systems (MIS)

Education systems, internationally, have only started collecting data over the last decade so the majority of data systems have only been in existence for less than ten years (Silliman, 2015) and there is a dearth of research on their implementation (Cho and Wayman, 2015). The increased access to useful information, more efficient administration, a reduction in workload, better time-management, and enhanced reporting capacity through the increased use of Management Information Systems (MIS) are some of the key enablers in the expansion in the use of data in education. The influence of Information Technology, and MIS in particular, has in fact changed the nature of leadership, management, decision-making, communication as well as teaching and learning (Shah, 2014, Schildkamp et al., 2013a, Talem, 1999).

Technology offers the potential to access enormous amounts of tailored, current information with sophisticated analysis, quickly, easily and increasingly, through mobile systems. 'Computer data systems offer unprecedented capacities for storing, integrating, analysing, and sharing data' among teachers, students and parents (Wayman et al., 2011, p.170). Furthermore, MIS provides a medium for collaboration, sharing expertise, resources, etc. and can act as a facilitator for professional learning (Wayman et al., 2012a). In fact, Wayman et al. (2004) suggested educator's analytical capacity will only truly develop if provided with a wide range of pertinent information, an intuitive and easy to use interface with customisable query facility and a variety of means to present information. Gold et al. (2012), however, found MIS systems are underutilised and mainly used by a few in administrative or management roles which make such systems an expensive resource when not used to their optimum. The factors influencing data use such as time, expense, training, workload, acceptance/support, organisational and

procedural structures are all relevant when considering the potential of MIS (Wayman et al., 2004, Wayman et al., 2011, Masha, 2014). These can pose as significant barriers as well as enablers. Opinions of the usability, versatility and value of the information available, contribute to the adoption and use of systems. Conversely, laborious processing, complicated interfaces and slow response times alienate users (Wayman and Stringfield, 2006).

2.6.5. Factors influencing data use

Schildkamp et al. (2014) categorise the factors that influence the process of data use into (a) organisation and contextual factors and (b) data characteristics and data system factors. Just as these factors support the use of data, their absence or ineffectiveness may pose serious barriers. Organisational influences, such as leadership, encourage and support teachers to use data but can also make a difference by establishing structures, modelling use and helping form shared vision and goals for data use (ibid).

The perception of the data and data systems will vary depending on whether they are valued for instructional or accountability purposes (ibid) and an effective Management Information System (MIS) will provide easy access to relevant, reliable and valid data in a timely manner.

Data use also depends on the knowledge, skills, and disposition for its use, for example, teachers need the assessment literacy, experience and skills in analysis and action planning to make effective use of the data (Reeves and Burt, 2006). Yet some staff find it difficult to identify teaching strategies, other than what they were using already (Anderson et al., 2010, Altrichter and Posch, 2014). In order to combat this, Data Coaches, who help staff gather, analyse, interpret and use data in an efficient manner are a considerable support in many systems (Marsh et al., 2015, Lachat and Smith, 2005).

Organisational structures such as meetings, improvement plans, and monitoring processes also promote data use. Time frequently appears as a substantial barrier (Wayman et al., 2012b, Reeves and Burt, 2006, Lachat and Smith, 2005); time to meet, to analyse, to form plans or simply to prioritise data use among the myriad of other demands. The issue of time also relates to opportunities to work collaboratively with colleagues. The increasing amounts and types of data can also lead to data overload and confusion. A narrow focus on achievement data can lead to a limited form of DIDM focusing predominantly on outcomes or even examination results (Rosenkvist, 2010, Morris, 2011). In addition, high stakes accountability or emphasis on outcomes can increase pressures and lead to playing the system, teaching to the test,

narrowing the focus on students in the margins or even the exclusion of others (Ehren and Swanborn, 2012).

Concerns over security, the quality of the data (reliability, validity, timeliness, etc.) and users attitude towards data use can all make a positive or negative contribution depending on how they are regarded (Means et al., 2010).

Wayman et al. (2012c) argue that the influence of leadership is the most important factor in overcoming barriers to data use for instruction. Time for data based activities, access to appropriate data, investment in technology to manage data, a school culture that supports data use, professional development opportunities focused on data and opportunities to collaborate with colleagues on data are all enablers that help to overcome these barriers.

2.7. Teachers' use of data

2.7.1. Move from organisational to classroom use of data

Over the years the literature on DIDM has evolved from its initial focus on the role of data for accountability purposes to examining how data can contribute in developing or guiding school improvement efforts, especially in ways that impact student achievement (see Schildkamp et al., 2013b). Van der Kleij et al. (2015) argue that early DIDM initiatives essentially represented a behaviourist philosophy which did not explicitly consider the socio-cultural context of the school or classroom. The literature on the pattern of decisions from raw data, through teacher analysis, to changed instruction and improved students outcomes has not received much traction until relatively recently. It appears that the educational reform discourse took for granted the conversion of data into instructional decisions, yet, whether and how data informs instructions depends, to a significant extent, on teacher level factors. Datnow and Hubbard (2016) found the relationship between teacher's beliefs about data and their capacity to use data for instruction was not significantly addressed in literature and argue this is fundamental to school improvement efforts. Teacher use of data may involve qualitative and quantitative data, for example; assessment data, classroom observational data and/or student and teacher interview data amongst others, however, other than some research on the use of assessment data, the area has not received much attention (Poortman et al., 2016). Lately, research seems to have shifted more towards a sociocultural paradigm which emphasises the interaction between protagonists and their environment, so decisions about learning arise from the interplay of the actors, actions and the context (Wiliam, 2011). Thus, instead of controlling for

the context, the focus now is on the activities undertaken in light of data in particular contexts (Coburn and Turner, 2011, Schildkamp et al., 2013b, Vermeulen and Kleij, 2012). Altrichter and Posch (2014) describe how evidence-based governance has come full circle, from an original dissatisfaction with teacher led school improvement which resulted in the development of external instruments to direct change, only to realise this cannot be achieved without teachers reflecting on and responding to data. In their research, Curry et al. (2016, p.89) found 'when data is used to inform instruction rather than evaluate instruction, teachers begin to practice reflective teaching'. Hattie and Yates (2013) research also indicates teachers who use evidence of learning to inform and improve their teaching have a greater impact. Whereas DIDM at the organisational level is dominated by systematically gathered quantitative data, teacher classroom based decision making is more qualitative based such as using observation, questioning and conversation (Van der Kleij et al., 2015). Thus, in Formative Assessment, teachers are continuously gathering, analysing and using evidence of learning to direct what happens next (see McMillan, 2012, Van der Kleij et al., 2015).

2.7.2. Teacher activities involving data

Through the myriad of interactions with students on a daily basis, teachers come to understand the performance levels and learning needs of their students. Even when questioning in class, teachers are not only assessing students' knowledge: they are monitoring students understanding, engagement, motivation and behaviour. This information serves several purposes: planning lessons, adjusting instruction extemporaneously, evaluating progress, structuring groups and diagnosing misunderstanding (Mandinach and Gummer, 2012, Stiggins, 1991). Reflecting on the evidence of learning, be it verbal or visual, from the whole class or individual students, formal or informal, are all fundamental to effective planning and teacher practice. As this information forms the basis for teacher's actions, it is not, therefore, a separate enterprise but is integral to evidence based, decision-making processes. There is a significant challenge in capturing these forms of data in a manageable way and then engaging in effective activities to make use of them. "Tacit knowledge is deeply rooted in an individual's action and experience, as well as in ideas, values or emotions that he or she embraces" so it is, therefore, often difficult to express or analyse (Altrichter and Posch, 2014, p.9). Teachers use of data also depends on their understanding of what constitutes worthwhile and valid data, the types of data available, their capacity to analyse, their content knowledge and pedagogical skills, their disposition to work with data as well as organisational factors such as supports for using

data, access to professional development, collaborative culture and DIDM leadership (Mandinach and Gummer, 2012, Hoogland et al., 2016, Mandinach and Jimerson, 2016). To gain a comprehensive understanding of their students and their needs, teachers need to use more than just assessment data; they must consider the role of data such as demographics, attendance, health, behaviour, attitude and welfare which all have an impact on student dispositions. For school accountability, however, often it is exam performance that takes precedence and contributing factors are neglected or examined in isolation (Mandinach and Gummer, 2016, Mandinach and Jimerson, 2016).

In a survey in the US, Means et al. (2009, p.15) found the most common use of data reported by teachers were informing parents about student progress, tracking individual student scores, and estimating whether students were making adequate progress. In a similar vein, they found teachers also used the Management Information Systems (MIS), in particular, to:

- Track other measures of student progress
- Identify skill gaps for individual students to tailor materials to his/her skill profile
- Determine whether the class or individual students are ready to move on to the next instructional unit
- Track standardised test scores by year group
- Inform curriculum changes
- Evaluate promising classroom practice
- Inform student placement in courses or special programs
- Decide whether to give students test-taking practice
- Grouping students in class

2.7.3. Assessment Literacy

Young and Kim (2010) describe the capacity to implement appropriate assessment approaches, for both formative and summative purposes, to provide constructive feedback, and make consistent and objective judgements based on assessment as 'Assessment Literacy'. Fullan (2000), describes Assessment Literacy as an ability to gather dependable student data, a capacity to examine student data and make sense of it and an ability to make changes in teaching derived from that data. Mandinach and Gummer (2012) suggest Assessment Literacy is a fundamental component of broader data literacy and, despite this, Assessment Literacy is an area teachers rarely receive training in (Datnow and Hubbard, 2016). The application of

assessment data has increased in light of policy demands and data systems, yet an understanding of the implications for teachers and professional development still lags significantly behind (Piro et al., 2014). Altrichter and Posch (2014) found even teachers who were positively disposed towards using external performance measures in their planning, did not find it easy to process information about their students in order to derive practical consequences. Meanwhile, Datnow and Hubbard (2016) noted that a teacher's confidence with data analysis and interpretation relied largely on their sense of self-efficacy with those skills. A distinction may be made between the use of assessment data with a summative and outcomes orientation or a perspective that seeks insights into the learning process in order to support learning and adapt instruction (Stobart, 2008).

2.7.4. Summative Assessment

2.7.4.1. Rationale

Traditionally, assessment is, curiously, seen as a distinct activity from instruction (McMillan, 2012) which conforms to a predominately summative paradigm. From this perspective, summative assessment is akin to evaluation in many respects; adjudicating mastery of a defined domain, providing retrospective feedback, it comes at the end of the learning experience, generally appears in written form, and is staged periodically (Stiggins, 2002). Similarly, summative assessments are usually categorised by quantitative figures such as grades or percentages. Formal tests, examinations, and assignments are classic ways of measuring student progress, certifying knowledge/skills and are fundamental to accountability systems but not, necessarily, designed to directly improve learning.

2.7.4.2. Use of Summative Data

Where summative tests are high stakes and prominent in discourse, teachers often feel compelled to 'teach to the test', and students are compelled to aim for grades, often, at the expense of understanding or enjoyment (Ehren and Swanborn, 2012, Silliman, 2015). Teachers may, therefore, perceive these external assessments as being in conflict with, or even damaging, to constructive views of assessment (OECD, 2005). Ireland is not alone in the significance it places on national summative tests, albeit in curricular rather than standardised tests (Rosenkvist, 2010), for the moment, at least. Hoover and Abrams (2013) found teachers who looked at the summative data, rarely related the findings to the curriculum requirements or the

needs of specific groups of student and they tended more towards cursory analysis of student performance than in-depth disaggregation.

2.7.5. Formative Assessment

2.7.5.1. Rationale

Formative Assessment uses evidence to support the learning process. Rather than just verifying what students have learned (or not), these assessments can provide evidence, which can be used formatively by teachers to adapt their teaching and students to adjust their learning. Hodgson and Pyle (2010) describe this in terms of feedback from the teacher to the student and from student's work to the teacher. Assessment for Learning, which is often used interchangeably with Formative Assessment, was defined by Broadfoot et al. (2002, p.2) as 'the process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there'. Formative Assessment essentially involves students and teachers analysing, interpreting and reflecting assessment data and taking constructive action on foot of these deliberations. This analysis of student's assessment and writing formative responses to students can also lead teachers to evaluate their own practices, the content covered and the activities engaged in, which, in turn, contributes to their own professional learning (Black and Wiliam, 1998). Giving descriptive feedback is more conducive to learning than quantitative grades or marks which promote competition and comparison. The formative use of assessments has an influence on the type of data gathered and the instruments used to gather data, i.e.: more authentic assessment methods such as portfolios and project work than multiple choice exams or large scale tests. Several significant studies have emphasised the substantial improvement in student learning, especially arising from feedback and peer and self-assessment (Hodgson and Pyle, 2010, Hattie and Timperley, 2007, OECD, 2005, Black and Wiliam, 1998).

2.7.5.2. Use of Formative Data

The NCCA (2002, p.45) described the significance placed on the Leaving Certificate as 'the towering presence' in Irish Education. Meanwhile, Stiggins (2002) counselled against the dangers of assessment apparatus, designed to meet policy and wider system needs rather than those of teachers and students. Instead, teachers should 'use the classroom assessment process and the continuous flow of information about student achievement that it provides in order to

advance, not merely check on, student learning' (Stiggins, 2002, p.761). Stiggins (2002) proposed teachers use assessment data formatively by:

- Articulating achievement targets in advance of teaching
- Discussing those learning goals with students in terms that they understand
- Using assessments to build students' confidence and help take responsibility for their own learning
- Giving descriptive rather than judgemental feedback with specific insights on how to improve
- Continuously adjusting instruction based on the results of classroom assessments
- Engaging students in regular self-assessment
- Actively involving students discussing their achievement status and improvement

Among the sparse empirical research on assessment in Ireland, Lysaght and O'Leary (2013) and Eivers et al. (2010) indicate that teacher's use of such Formative Assessment techniques is poor or emerging at best. Student generated class data has much greater diagnostic and indicative potential than the ever-dominant, external, high-stakes exams which can, in fact, lead to narrowing the curriculum (Stiggins, 2002).

2.7.5.3. Common Marking

Halverson (2010, p.130) states that 'data-driven instructional improvement relies on developing coherent systems that allow school staff to generate, interpret, and act upon quality formative information on students and school programs'. Reeves (2004, p.114) described the use of common assessments, developed and marked by teachers collaboratively as 'the gold standard in educational accountability' because these assessments are used to 'improve teaching and learning, not merely to evaluate students and schools'. The added benefit of this approach to grading and instruction is it provides a quality assurance mechanism for the teaching and learning. This approach fundamentally challenges the balkanisation of teachers and subject departments, prompting them into a professional dialogue about the rationale for their work.

2.7.6. Junior Cycle Reform

Several studies highlight the dominance of the Junior and Leaving Certificate assessment regime over the curriculum and teacher practice (Smyth, 2009, Smyth, 2007, Smyth et al., 2011, Smyth, 2011, Looney, 2006). The Junior Cycle reform proposals were an attempt to move away from a significant external summative assessment to a largely school-based model that would broaden students learning experience and place emphasis on the process of continuous learning and development (NCCA, 2011). The construct that has emerged still envisages broad-based learning experiences with an emphasis on experiential and interdisciplinary learning, however, an external examination regime remains, although depreciated. It is envisaged, however, that there will be an emphasis on the process of learning, with students demonstrating their learning over time and in a range of learning contexts (DES, 2015). The framework states that schools must "facilitate the process by which evidence of learning is generated, gathered, assessed and reported throughout the cycle to students and shared regularly with their parents/guardians" (DES, 2015, p.50). In spite of Government undertakings to provide support, moderation remains the most contentious issue with unions, in particular, expressing doubts about maintaining equitable standards and awards across the school system (Corner, 2015).

2.7.7. Teacher's discussions about data

One of the side-effects of the National Literacy and Numeracy Plan (DES, 2011a) and a significant feature of the School Self-evaluation Guidelines (DES, 2011b) is the requirement of teachers and schools to engage is a reflective process about the values, aims and practices informing the education they provide. 'Collaboration around the use of data brings focus to the conversations, a sense of purpose, helps teachers to learn from each other how to use data and allows for a fertile exchange of ideas and strategies' (Poortman, 2015, p.1). Schools and students generate enormous amounts of evidence about learning every year, but only a fraction is used for instructional guidance (Supovitz and Klein, 2003). Educators are now required to re-evaluate their decision-making processes and engage with evidence in a much more strategic manner than previously as part of SSE (DES, 2011b).

2.8. Ethical considerations

The ambiguous boundaries of how digitally-stored data, in particular, may be used raises several ethical issues. Among these are data ownership, access, ethical use, power and the

locus of control of data, privacy, security and the cadre of data users. Selwyn et al. (2015) highlighted the distinction between (a) the majority of individuals who, often unconsciously, create the source data, (b) the individuals who collect data and (c) the elites who have the expertise to analyse data. There is a danger that decontextualized data, and algorithmic analysis may lead to policies and pressures aimed at uniformity thereby inhibiting creativity and innovation that address the needs of minority groups of students (Greller and Drachsler, 2012). To avoid subjects feeling under surveillance or their privacy invaded, robust policies and protocols need to be established to protect data from abuse and ensure they are used in acceptable ways. These are particular issues in MIS and Learning Analytics (LA) where user's digital footprints and behaviours may be logged without their knowledge or approval. A balance is, however, required between preserving user privacy and providing open, versatile datasets that allow for aggregation and cross-classification. At present, in most Irish schools student learning and profile data are managed separately; however to use LA to its full potential integration of datasets needs to take place (Greller and Drachsler, 2012) which will require the formation of ethical safeguards. Eynon (2013) cited a number of such concerns with 'Big Data' including an inclination to use superficial 'technical fixes' for education research and practice, pre-determining students outcomes based on datasets, narrowing options based on the majority preferences and the pressure of constant surveillance on individual's learning. Also, a reliance on Big Data limits analysis to the information within datasets, possibly missing critical behavioural information. Big Data may both, reinforce and even exacerbate, existing social and educational inequalities, for example, those with access to technology will be more represented over those who do not (Eynon, 2013).

2.9. Summary

In organisational terms, the extent to which schools can improve depends substantially on the ability of the staff to solve problems, form plans and implement decisions and using data can make a valuable contribution to these. When implemented effectively, Data Informed Decision Making (DIDM) integrates empirical evidence, tacit knowledge, professional responsibility and cultural values (Leithwood et al., 2006, Earl and Katz, 2006). In an information rich environment where the production and use of data is accelerating, it is vital to be able to draw on a variety of evidence to inform decision making. There is a distinct possibility that the potential value of data will not be realised in many schools, possibly due to ideological distrust, lack of fundamental resources or the absence of a vision for effective data use (Ingram et al.,

2004, Kowalski and Lasley, 2009). With the increasing emphasis on School Self-evaluation practices, the way data is being used in schools is changing and education systems are getting more sophisticated in how to utilise data. The definition of data is now broadening to include formative assessments, activities such as observations, and applied data analysis of a wider range of school improvement issues (Campbell and Levin, 2009).

The literature on school use of data extensively focuses on the use of assessment data and other significant information on Pastoral Care, Classroom Management, Student Perception Data or Demographics is neglected or examined in isolation (Mandinach and Jimerson, 2016, Mandinach and Gummer, 2016). A narrow focus on Assessment, doubts about reliability or the risk of information overload may lead educators to ignore or dismiss potentially valuable information. The challenge, therefore, is to find the most relevant data with which to make the best decisions (Ma, 2012, Burns and Wilkoszewski, 2013). From a constructive perspective, however, as well as serving an accountability function, assessment data helps identify exceptional practice and contribute towards school improvement by identifying successes and deficiencies in student learning.

Anderson et al. (2010) found "the leadership of principals in establishing data use purposes and expectations, opportunities, training, access to expertise, and follow-up actions" (p292) is critical to the effective implementation of DIDM. Principal's experience and educational background are key factors that influence their data practices; where more experienced principals may rely on intuitive decisions, less experienced leaders and more instruction orientated principals are more likely to use data (Yoon, 2016). Principals with a strong conceptual background in DIDM are better able to guide their staff in the use of data. Such leaders are knowledgeable, committed and build strong visions for data use among their staff and can assist staff with the analysis and interpretation of data (Kerr et al., 2006, O'Day, 2002). Wayman and Stringfield (2006) observed that principals who worked closely alongside teachers found greater acceptance guiding them in using data to inform their practice. Sharing decision making not only promotes a shared vision, it improves morale, enhances the quality of decisions and contributes towards a culture of collaborative enquiry (Copland, 2003, Leithwood et al., 2004, Spillane et al., 2004).

Management Information Systems (MIS) now play a crucial role in the effective use of data in decision-making (Cho et al., 2015, Datnow et al., 2007, Wayman and Stringfield, 2006, Wayman and Jimerson, 2014, Wayman et al., 2012b, Coburn and Turner, 2012). The steady

growth in the capacity of technology and increasing demands on schools for information has made schools more and more dependent on information systems. Increasing amounts of data are stored electronically and as technological advances facilitate easy distribution, there is a challenge to prevent unauthorised access to information. This is more significant in schools as they accumulate substantial amounts of personal, and often sensitive, information about students, parents and staff (Levin et al., 2012, Boudett et al., 2005). In addition, the inexorable increase in the numbers of students using various digital devices for learning and classroom assessment, in particular, inevitably raises new and varied forms of data.

Providing structured time for collaboration, involving either the whole staff, working parties or specially convened groups, is one of the main ways schools use to develop teachers' knowledge and skills. Working collaboratively with data challenges assumptions and provides participants with new insights and new knowledge (Schildkamp et al., 2015). Organising a group of staff to work together on data can be a productive way to establish practices and assist teachers develop their skills. Schildkamp et al. (2015) compared the quality of group deliberations and found responses varied from analysis, synthesis, goal setting and reflection at the effectual end to little more than storytelling at the other end. They found discussions do not necessarily lead to action but may challenge preconceptions and there is powerful learning in finding out one is wrong (ibid).

As teachers and schools endeavour to improve student achievement, the use of evidence is becoming central to how teachers evaluate their practices and monitor students' progress (Knapp et al., 2006). Increasingly Formative Assessment is regarded as an effective way of using student achievement data to support instructional decision making. These decisions include, "how to adapt lessons or assignments in response to students' needs, alter classroom goals or objectives, or modify student-grouping arrangements" (Hamilton et al., 2009, p.1). This may include organisational, pedagogical and technological practices that foster effective data use.

Chapter 3

Research Methodology

3.1. Introduction

The purpose of this Qualitative Case Study is to identify what data is used in decision making in secondary schools and to investigate how that data is used for improvement purposes. Principal data use, teacher data use and organisational influences emerged from the literature as significant themes in how data is used in schools and are addressed in this research. This study examined the situation in seven second level schools, with various characteristics, from across the country, but were identified as demonstrating good practice in the use of data. This section describes the epistemological basis for the research design, the rationale for using a Case Study Methodology and the considerations in selecting appropriate methods. The range of data collection methods used are explained including individual interview and focus group interviews, observations, and review of documentation. There is a brief discussion about the data analysis process and the participant selection criteria. The measures undertaken to ensure validity and reliability of the findings and the ethical considerations are also explained.

3.2. Philosophy/Paradigm

3.2.1. Introduction

The research philosophy and its underlying perceptions of how the world is viewed forms the fundamental basis on which research in conducted. This research is based on the assumption that one's understanding of knowledge is a matter of perspective, in other words, everyone approaches phenomena from their own unique point of view. Only each individual, themselves, can know what they think, physically experience or believe, and each of these aspects impacts on the other and cannot be taken in isolation. From a subjective epistemological point of view: one starts from what one knows or understands from one's own unique vantage point.

A review of literature was undertaken in order to explicate the inherent philosophical constructs in the researcher's worldview and to ensure consistency in the research paradigm to be used, ie: align the ontological, epistemological and axiological assumptions. Understanding these beliefs about the nature of reality, truth and knowledge influence the research approach and help expose and minimise bias. Various paradigms address phenomena in different ways so different kinds of knowledge may be derived through observing the same occurrence from different philosophical perspectives (Hatch and Cunliffe, 1997).

3.2.2. Positivist Paradigm

Cohen et al. (2013) describe Positivist Paradigm as derived from the study of natural science and is characterised by the testing hypothesis. It presumes that the social world exists objectively and externally. Valid knowledge is based on observations of this external reality and theoretical models can be developed that are generalizable and predictable. Facts can be measured empirically using quantitative methods. The positivist approach is neither compatible with the philosophical basis of this research nor appropriate as this research is not based on a particular theory.

3.2.3. Realist Paradigm

Realist paradigm posits that phenomena can exist independent of human consciousness, but knowledge of reality is a result of social conditioning (Krauss, 2005). It proposes that the study of natural and social sciences are different, that social reality is subject to interpretation but, similar to positivism, phenomena can be studied empirically and objectively. Unlike positivism which can examine direct casual relationships and form generalizable theories, realists argue that phenomena are more likely to form general tendencies depending on circumstance, rather than comply with absolute rules. Realist paradigm, therefore, involves research from a number of different perspectives that combine to give greater understanding (see Ritchie et al., 2013, Cohen et al., 2013). Realist paradigm holds that reality is, in some respect, independent of the researcher and is, therefore, incompatible with the researcher's philosophy.

3.2.4. Interpretivist Paradigm

Interpretivist paradigm arose from criticism of positivism's stance on separating the researcher from what is being researched ie: the expectation that a researcher can observe without allowing their values to interfere is arguably impossible (Denscombe, 2010). Interpretivism holds that there is a fundamental difference between the natural and social sciences. In the social world, individuals make sense of situations based on their knowledge, experience and feelings. Meaning is, therefore, constructed and reconstructed continuously in light of experience and resulting in different realisations depending on the situation. This leads to multiple realities (Lincoln and Denzin, 2003). It is important to understand the contextual factors that influence various interpretations. Research aims as much to understand and describe the context as it does to understand the thoughts, feelings and actions of the people involved. This paradigm is

highly contextualised, less generalizable, and reasoning is more inductive than deductive. Interpretivism is often criticised for being subjective and it is important, therefore, to take measures to avoid bias (see Mack, 2010, Johnson and Onwuegbuzie, 2004, Cohen et al., 2013).

The Interpretivist paradigm is appropriate for this study because it locates the knowledge generation process by key figures at the centre of the research. The focus of this research is on understanding the emerging experience of principals and teachers. The research will, therefore, examine the subjective interpretations of these participants' own reality. Operating within the interpretivist paradigm, this research seeks to 'understand, explain, and demystify social reality through the eyes of different participants' (Cohen et al., 2013, p.15). This research seeks to understand rather than explain the phenomenon of data use in schools.

3.3. Case Study Methodology

3.3.1. Selection of Case Study methodology

Case Study was chosen as the best vehicle to pursue the objectives of this study because the issues are multifaceted and the approach facilitates a robust, in-depth exploration of the phenomena to reveal the real-life complexities involved (Yin, 2014). In accordance with an Interpretivist epistemology, a Case Study approach acknowledges and respects the validity of experiential knowledge of the participants involved.

A case study examines the decision making process: why decisions were taken, how they were implemented and with what result (Schramm, 1971, as citied by Yin, 2014). Similarly, Arsenault and Anderson (1998) view case studies as being concerned with how and why things happen, allowing the investigation of contextual realities and the differences between what was planned and what actually occurred. Therefore, not only does a case study present, analyse and interpret the uniqueness of real individuals and situations through descriptive accounts but it also catches the complexity of the behaviours involved. The approach enables the researcher gain a holistic view of the phenomenon and can provide a more complete picture because a number of perspectives are sought.

Creswell (2012b, p.465) defines a Case Study as 'an in-depth exploration of a bounded system based on extensive data collection' and could relate to an activity, event, process or individual. This research examined a contemporary issue, looked at from a real-life perspective within

real-life school contexts (Yin, 2014) in order to 'to bring into focus the in-depth features and characteristics' (Briggs et al., 2007, p57) of the issues being studied.

3.3.2. Types of Case Study

According to Yin (2014) there are three types of case study research – Exploratory, Descriptive and Explanatory. The Exploratory Case Study approach is one that looks at the 'what' of phenomena. The Descriptive Case Study approach focuses on the 'how' and most often involves an action in its real-life context. Thirdly, the Explanatory Case Study looks at 'how' and 'why' based on theories and applies them to the case under study. This is only possible where viable theories exist in the domain under study (Yin, 2014). Yin (2014) suggests there may be cross-over between types and Descriptive Case Studies may be Exploratory, if relatively little research has been done in the area. This is the situation with this research as it is the first time that empirical research of this nature has been undertaken in this area in Ireland. This work is predominately a Descriptive type as it endeavours to organise and summarise principal's and teacher's experience of using data and it is Exploratory in its search for the main types of data they use for School Improvement Planning. In the absence of research on current practice, this research aims to describe the phenomenon of data use in schools, document the nature of existing variables, how they interact and provide the basis for further study. The research does not claim to be representative of all schools in the country but illustrative of the seven schools involved. There are critics of descriptive research who deride it for the inability to control variables, for frequently yielding only descriptive rather than predictive findings and because it does not seek to produce theories of explanations (Bennett, 2004). The findings in this research, however, will provide details of the issues involved in DIDM and provide a basis to formulate hypothesis and further explore of the topic in the future.

Stake (1995) on the other hand, proposed three categories for the design of Case Studies: intrinsic, instrumental and collective. The Intrinsic Case is exploratory in nature, guided by an interest in the case itself rather than a desire to generalise or theorise across cases. The opposite is the case in Instrumental Case Studies where exploring the issues in order to generate theories and generalisations are the priority. A Collective Case Study incorporates multiple Instrumental Case Studies with a view to better understanding the issues involved. The present study, which is a Collective Case Study, aims to add depth and breadth to the literature base that may, eventually, contribute to conceptualising theories or principles of data use. In a Collective Case Study, a common set of research questions are devised to guide the study in

each individual case, however, each case is treated as its own individual entity. While, the researcher is particularly interested in the common characteristics that link the cases, it is important not to ignore the individuality of each case either. This requires a thorough and methodical approach and careful consideration for the nature and scope of data being gathered. Under Stakes classification (Stake, 1995), this Collective Case Study combines different perspectives on the same phenomena from different schools. The researcher locates the cases in their larger context through the literature review which contributes to the inferential ability and potential generalisability of the findings. This mode of research enables the author to use a number of data sources to understand the complex social processes involved. Pegram (2000) argues that the use of multiple data-collection tools provides a rich picture of the case being analysed.

3.3.3. Components of Case Study

Yin (2014) proposes that Case Studies involve five components: the research questions; its propositions, if any; its unit(s) of analysis; the logic linking the data to the propositions; and the criteria for interpreting the findings. Stake (1995) on the other hand suggests a more flexible model involving a few questions to focus the initial research process and, as the investigation unfolds or as the problem areas become progressively clarified and redefined, research questions are redefined (Stake, 1995). The approach followed in this research, however, follows Merriam's (1998) framework; conducting literature review: constructing a theoretical framework; identifying a research issue; developing key research questions, and selecting a purposeful sample. This Case Study methodology incorporates this more inductive approach to research (Creswell, 2012a) and gradually builds up a conceptual understanding of the particular cases in which these participants are situated.

3.3.4. Criticisms of Case Study methodology

The Case Study method is not without criticism and there are limitations surrounding case studies. Yin (2014) argues that the greatest concern regarding case study research has been the lack of rigour due to equivocal evidence or biased views influencing the findings and conclusions. Furthermore, according to Hammersley (1997) case studies provide little basis for scientific generalisation and not only can they take too long but they can also result in massive, unreadable documentation. These issues are addressed below.

3.4. Research Methodologies

The research method is the enquiry strategy used during a study and reflects the underlying epistemological assumptions (Creswell, 2012b). Although not without controversy, the three main categories are described as Quantitative, Qualitative and Mixed Methods. In accordance with Interpratist principles and because they are particularly appropriate in social research studies, qualitative methods are used to collect data and derive conclusions in this research (Creswell, 2012a). Qualitative methods provide a forum where descriptions, in 'natural' settings, assist participants to understand fully, and therefore partake fully, in that which is being researched. The researcher builds a complex view of the situation by documenting and analysing the responses gained through structured research so that any conclusions drawn or gained can be confirmed (Creswell, 2012a, Cohen et al., 2013).

3.4.1. Interviews

Since the main purpose of the research concerned establishing schools experience using data, interviews were the main method of collecting data. According to Kvale (2007) the interview in research marks a move away from seeing humans as non-rational objects and data as somehow external to individuals towards regarding knowledge as generated between humans, often through conversations. Furthermore, Patton (2015) argues that the benefit of using interviews is that

> '…we cannot observe feelings, thoughts and intentions … we cannot observe how people have organised the world and meanings they attach to what goes on in the world … the purpose of interviewing then, is to allow us to enter into the other person's perspective' (p. 426).

The necessity to interview school leaders (mainly principals) is essential since the research endeavours to understand their thoughts and actions about data. It is also a very informative method of data collection, as the interviews give the opportunity to meet the subjects of the research in their own context. The interviews enabled more to be said about the research than is usually mentioned in surveys, they give more open-ended answers and they are better for clarifying and probing issues as they arise.

The three main types of interview are structured, semi-structured and unstructured and these can be carried out face-to-face or over the telephone or Internet (Bernard, 2012). Structured interviews are based on predetermined questions, asked without variation and often do not

involve follow up questions. Conversely, unstructured interviews do not usually reflect preconceived theories of ideas and involve broad open ended questions that often progress based on previous responses. Semi-structured interviews involve a number of key questions that help structure the discussions but allow flexibility to pursue some responses in more detail. Closed questions elicit narrow specific responses, whereas open questions lead to longer more detailed responses (see Creswell, 2012a, Cohen et al., 2013).

The semi-structured interviews conducted during this research involved the same schedule of open questions across all the centres. This helped the researcher to be consistent: stay focused and avoid improvisation, diversion and inconsistency while still allowing responses to be probed further where necessary. Interviews were conducted with six Principals and one Deputy Principal in their offices over a six month period from March to September 2015. The interviews varied from one to two and half hours in duration, were recorded on a Dictaphone then subsequently transcribed.

3.4.2. Focus Groups

Focus groups share many common features with less structured interviews, however, the discussion is guided and moderated by the researcher. A focus group discussion is a good way to compile information on a specific topic of interest among people with a shared understanding when the time available is limited (Creswell, 2012a). Often a wider range of data can emerge through the interactions in focus groups; comments by one participant can initiate a chain reaction of additional comments from others or can stimulate new ideas. Responses may be more spontaneous and genuine because participants are not required to answer every question (Vaughn et al., 1996). The researcher's role is to facilitate a group discussion, prevent individual participants from dominating, managing differences of opinion and, where necessary, encouraging reticent participants. Transcription and analysis of Focus Group discussions is more complex because of the number of voices and the nature of the interaction involved (see Cohen et al., 2013). Seven focus group interviews were held over the course of a nine month period from March to December 2015 and groups varied in size from three to seven.

3.4.3. Document Analysis

The use of documentary methods refers to the analysis of documents that contain information about the phenomenon being studied (Bailey, 1994). Guba and Lincoln (1981, p228) define a

document in this context as 'any written material other than a record that was not prepared sceptically in response to some request from the investigator'. The researcher needs to consider the original purpose of the document, including the target audience and, in this instance, the style, tone, facts or opinions are less important than the purpose, accuracy and completeness. The researcher, essentially, determines what is meaningful and relevant, forming emerging themes into categories through focused examination, re-reading and integration with other methods (Bowen, 2009).

A variety of school documents were examined for this research which may, broadly, come under School Organisational Documents (Schemes of work, Policies, Presentations, teacher and student journals), Planning Documents (SSE and DEIS Reports; subject and class plans) and Attendance. These gave an insight into the types of data available, their evolution over time and their practical application in the school.

3.4.4. Secondary Data Analysis

Secondary data analysis is analysis of data, collected by someone else, for a different purpose than currently being considered, and may be described as 'second-hand analyses' (Smith, 2008). When undertaken with care and diligence, it can provide a valuable insight in qualitative research. 'The same basic research principles that apply to primary data analysis apply to secondary data analysis, including the development of a clear and clinically relevant research question, study sample, appropriate measures, and a thoughtful analytic approach' (Smith et al., 2011, p.920). Secondary Data Analysis is conducted where the timeframe or the cost of primary data collections is prohibitive or suitable datasets are already available. In contrast, secondary datasets can provide large sample size, relevant parameters and longitudinal detail (Smith, 2008). Whereas with primary data, researchers can strictly control the study population and prescribe the exact parameters of the investigation, with secondary data analysis, these may not match exactly what the researcher wishes to collect, research variables may not be obvious and causality may be more difficult to assess (see Smith et al., 2011, Johnston, 2014, Hofferth, 2005, Church, 2002, Smith, 2008).

Planning Documents (for SSE and DEIS Reports), Attendance and Examination Records (Appendix IV) were the main documents examined for this research which were compiled by participants for their own purposes. Most of the secondary data did not contain sensitive information, however, the assessment and examination information did, which raised potential

ethical issues of informed consent. Personal information was obscured during the observations and all identifying features were removed before being printed. This information was used to support the statements made by participants and identify practices or approaches not eluded to during interviews, thereby, complementing the primary data collection.

3.4.5. Field Notes

Field notes are contemporaneous notes of observations or conversations taken during the research process. Field notes may include verbatim transcripts of conversations or brief notations that can be elaborated on later (Erickson, 2012). Bryman and Bell (2015) categorised field notes into: mental notes when it may be inappropriate to take detailed notes; jotted or scratch notes, taken at the time of observation or discussion and consisting of highlights that can be remembered for later development; and full field notes written up as promptly and as fully as possible (see Cohen et al., 2013). Jotted notes were taken during conversations with participants relating to types of data and uses, also lists were made of various documents and how they were used, especially if it was not possible to obtain copies. Brief notes and summaries were penned at the time and expanded on within a short period afterwards.

3.4.6. Observation

Observation is a form of correlational research in which a researcher observes ongoing behaviour (Cohen et al., 2013), in this case the process that principals and teachers go through when they analyse a piece of data, usually in text format and on their own. This approach enables the researcher capture the setting that participants work in including aspects that may not be obtained by other methods (Patton, 2015). It is important, however, to be alert to the potential for impressionistic judgements or bias, listening carefully and to maintain a sense of objectivity through maintaining a professional distance (Cohen et al., 2013, Ritchie et al., 2013). Through the observation, researchers can uncover factors that are important but not obvious from the narratives, thus, giving a further insight into the phenomena as well as providing a means of triangulation.

Observation varies by the extent to which the researcher intrudes upon or controls the environment and is typically divided into controlled, naturalistic (also direct or non-participative) and participant observation (Cohen et al., 2013). Controlled observation is usually a structured observation and likely to take place in laboratory type conditions. Participant observation enables the researcher to scrutinise the activities engaged in by the

study participants in their natural setting through exposure to, and participation in, those activities. In naturalistic observation, care is taken not to interfere in the variables or setting being researched. Naturalistic observation tends to be more focused and often involves an observation scheme. The observations in this context were the participant rather than naturalistic type because the demonstrations were somewhat contrived as participants verbalised what they were doing and the researcher had to interrupt on occasion in order to get clarification. During the process the researcher took field notes about what was observed as well as sound recording the participant descriptions.

Limitations include the possible distortion of the findings through participants altering their actions in light of being observed and restricted to what is being observed, participants feeling and thoughts may not be obtained (Patton, 2015). Finally, there is a danger of subjectivity through interpreting what is seen rather than describing what is observed. These aspects were minimised by having participants select the data to analyse and describe their actions with minimum interruptions. Sessions were recorded on a Dictaphone and examined to triangulate the observational findings.

3.5. Data Analysis

3.5.1. Approaches to analysis

Data analysis involves examining research data using critical evaluation and logical reasoning. According to Yin (2014) the Case Study methodology is still evolving and suffers from the paucity of well-defined strategies and data analysis techniques. Stake (1995) defines analysis as '… a matter of giving meaning to first impressions as well as to final compilations. Analysis essentially means taking something apart' (p. 71). Stake also describes strategies for analysing data: Categorical Aggregation; Direct Interpretation; Correspondence and Pattern Checking and Naturalistic Generalisation. Categorical Aggregation involved the emergence of key themes from repetition of instances whereas Direct Interpretation involved the emergence of key themes from critical data. Finding Patterns between two or more categories and Naturalistic Generalisation involves identifying the research findings that can be applied to other cases and are techniques used in the search for meaning (Stake, 1995).

Mason (2002) outlines three other approaches, labelling them; literal, interpretive, and reflexive. Literal involves looking at the exact use of the particular language used, Interpretive involves making sense of participant's accounts and interpreting meaning. The Reflective

approach considers the researcher's influence in making sense of the accounts. As Mason suggests, in practice all three approaches will be relevant. The recording and direct transcription documented exactly what was said in this research, the presentation of the findings and the subsequent discussion are more reflective of the researcher's interpretations which conforms to his epistemological stance.

3.5.2. Process of analysis and NVivo

Making sense of the data involved combining, condensing and interpreting the contributions from participants into ever more refined categories (Creswell, 2012a, Leedy and Ormrod, 2015, Merriam and Tisdell, 2015) in the form of open codes in QSR NVivo 10 analysis computer programme. Once the open codes are established, axial coding is used to identify and draw connections between the open coding categories, further refining the data (Leedy and Ormrod, 2015). Qualitative analysis software provides a mechanism to researchers wishing to use an inductive approach to identify themes and interesting detail, helping categorise them and keep track of the developing ideas (ibid). The programme provides a rigorous and efficient means of interpreting and making sense of the data (Bringer et al., 2006).

The transcripts from individual and focus group interviews and other data were examined and divided into categories in order to undertake analysis of the different themes identified in the literature, namely type of data, principal use, teacher use and organisational influences. Using NVivo, emergent sub-themes or emphasis, suggested by the participants themselves, were formed into nodes and then explored to find patterns. The data was analysed, not only in the frequency of issues raised but the emphasis placed on them. The documents obtained during the school visits and the observational field notes were examined, not only to triangulate statements made during interviews but, to identify sub-themes, practices and processes. This was an iterative and incremental process of examination and cross-tabulation. There is a challenge in the variety of meanings, attitudes and interpretations that emerge in qualitative data analysis and emerging hypotheses changed and developed in the course of this research. Having thoroughly examined all the coded data from all the sources, categories and themes; common patterns, relationships and ideas emerged and are presented in the findings.

The QSR NVivo computer programme was used in the analysis of the data. Proponents of qualitative analysis software suggest there is a danger of reducing analysis to a technically automated process rather than one that requires human interpretation (Bringer et al., 2006,

Bourdon, 2002). Software such as NVivo, however, facilitates better data management, reducing time consuming repetition and can provide greater accuracy and transparency (Welsh, 2002). It can provide fast and broad methods of inquiry that are more versatile and efficient for collecting, storing and presenting (Basit, 2003). Although the software 'is less useful in terms of addressing issues of validity and reliability in the thematic ideas that emerge during the data analysis process' (Welsh, 2002, p.12), it does add rigor to the analytical process.

The analysis of the documents, observations and field notes involved coding the content into themes in a similar manner to the interview transcripts. This involved skimming (superficial examination), reading (thorough examination), and interpretation. Through an iterative process of deconstruction and reconstruction of the material collected, relevant meaning was extracted from the data, reflecting the interpretation of the researcher (Bowen, 2009). Excerpts, quotations, and entire passages were organised into themes, categories and case examples, specifically through the analysis. The integration of themes and codes, from the interview transcripts and other documents served to triangulate the data gathered.

3.6. Sample

The aim of this research was not to generalise the findings, but to provide an in-depth exploration of what data is used in a number of schools and how they are used. Purposeful or criterion-referenced sampling, therefore, was used to identify the best sites to demonstrate this phenomenon (Creswell, 2012a). Unlike quantitative research that seeks to form theories or generalisations, the sites in this research were selected as exemplary in explicating data use in schools. Sampling in this instance, therefore, is not concerned with sample size, randomisation or generalisability, but with the potential richness of information.

> The logic and power of purposeful sampling lie in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the inquiry, thus the term purposeful sampling. Studying information-rich cases yields insights and in-depth understanding rather than empirical generalisations. (Patton, 2015, p.264)

Creswell (2012a) describes a range of sampling techniques including: maximal variation, critical, extreme case, typical and theory amongst others. Another, the Homogeneous type, where sites or people are selected because they share similar characteristics to that being studied, was deemed most appropriate in this instance. Selecting homogeneous cases may

reduce variation but may indicate that the practices common in all schools may be possible in other schools outside the sample (ibid).

There are no generally accepted rules in the determining sample size in qualitative studies, however, the size of the sample should be large enough that any new knowledge is exhausted, which is known as saturation (Gentles et al., 2015). Although the literature on Case Study emphasises the importance of selecting suitable cases for research, there is a dearth of guidance in the number of cases or collection methods that are appropriate.

Schools were identified by Advisors in the Professional Development Service for Teachers (PDST), who work with schools across the country, as schools that exemplify excellent practice in relation to data use. Ten schools were identified and this was narrowed down to seven based on proximity to the researcher and availability of the principals. This represented five community colleges (one DEIS, two large), two secondary schools (one female, one mixed, both DEIS). The teachers were selected by the principals based on the criteria that the teachers exemplify the use of data among the staff and, as far as possible, come with a range of experience, subject background and positions of responsibility. One principal became unavailable at the last minute so the Acting Deputy Principal substituted for him.

3.7. Validity and Reliability

Validity is a measure of what a piece of research aims to achieve or how well it reflects the reality it claims to represent (Ritchie et al., 2013, Cohen et al., 2013). This research can claim to be an accurate expression of the experience of the leaders and teachers in the schools in this study. The interpretivist philosophy underpinning this research posits that there are different perspectives on valid knowledge which makes it impossible to implement the concepts of validity and reliability in Positivist terms. Instead, Yin (2014) suggests careful attention to four criteria during the design and implementation of a study to ensure research quality:

- Construct validity through the triangulation of multiple sources of evidence, chains of evidence, and participants validating reports
- Internal validity through pattern matching, explanation building and logic models
- External validity through generalisation (less relevant for Descriptive Case Study)
- Reliability through case study protocols and evidential databases.

Triangulation of information from different sources is used in order to increase the credibility and validity of this research. In an effort to remain impartial and provide for comparability, the researcher used the same schedule of questions at each of the centres. The comparison of themes and patterns across different modes of data collection added another dimension to the triangulation process. Yin (2014) argues that it is worthwhile in Case Study research to combine methods and sources. Triangulation is a 'method of cross-checking data from multiple sources to search the regularities in the research data' (Bassey, 2000, p105). By having a cumulative view of data gathered from different contexts, it is possible to increase the confidence in research findings by identifying where the different data intersect (Silverman, 2009).

In this research triangulation was achieved by using four main methods of data collection: Individual Interviews with principals, Focus Group Discussions with teachers, Observation of teachers and principals analysing data and an examination of a collection of relevant documents. In addition, the researcher endeavoured to engage in a logical and transparent process of deduction, based on the evidence and careful adherence to protocols including using the same scheme of questions and procedures at each centre. The sound recordings were transcribed verbatim, a range of relevant evidence discussed during the interviews was carefully compiled and all this data was scrutinised for triangulation purposes. The transcripts were returned to all participants for verification and none were altered, although there were cases of clarification. In order to hone his research skills, devise protocols and procedures for the investigation, trial the questions, test the research instruments, and gain insight into the practicalities required, the researcher conducted a pilot study beforehand. The precautions described above, added to the validity and reliability to the research process from data gathering to the formation of conclusions.

3.8. Ethics

In undertaking and reporting on any kind of research there are a number of ethical issues to consider, especially when dealing with sensitive school information and arising from one-to-one conversations (Creswell, 2012a, Cohen et al., 2013). With this in mind, the purpose and nature of the research was made clear to all participants before any information was recorded. Participants were told that they could withdraw at any time and any information they did not want disclosed would be complied with. Interviewees received a copy of the transcription and were asked if they wished to have any information clarified or corrected. A number sought

assurances around confidentiality but did not request to change any detail. It was important to respect the anonymity and integrity of the schools and people involved and, as a result, pseudonyms are used when referring to principals, teachers and schools involved. It was made clear to participants that any information compiled would be maintained securely and would only be used for the purpose stated and shared with the assignment assessors.

3.9. Summary

This chapter addresses the conceptual and practical considerations that informed the research design used in this thesis. The research is located in an interpretivist paradigm and used a Case Study design because it facilitated the in-depth and holistic exploration of the issues, providing descriptive accounts of the complexities involved and framed in the participants own context (Yin, 2014, Cohen et al., 2013). Individual and focus group interviews were the primary source of data because they enabled the researcher to establish a context for the use of data and allowed participants to construct their own narratives about their experience. The Case Study approach allowed the research to choose a sample that would yield credible, current and insightful information from experienced and skilled participants.

Chapter 4

Research Findings

4.1. Introduction

This chapter presents the findings of the Case Study into seven schools on what data they use and how they use that data. It is based on interviews with the school leaders (six principals and one Deputy Principal), Focus Group discussions with teachers, an examination of associated documentation and observing the school principal and teachers demonstrate how they analyse data. For the purpose of triangulation the structure and focus of the questions were similar across the interviews, discussions and document analysis. In references, schools are differentiated by three letters, ANN, BOB, DAN, LEO, JOE, PAT and TOM, the detail obtained mainly from principals are delineated by the suffix -P, Focus Group participants are referred to by -FG and detail obtained from an examination of documentation has -D after the school reference.

School pseudonym	Size	Gender	DEIS
BOB	700+	Mixed	Yes
DAN	600+	Mixed	No
JOE	1000+	Mixed	No
ANN	900+	Mixed	No
LEO	1000+	Mixed	No
PAT	700+	Mixed	Yes
TOM	300+	Female	Yes

Table 2 Profile of research schools

The review of literature identified four key themes: the nature of data used in school planning; principal's use of data; teacher's use of data; and organisational influences on data use, around which this research is framed. From an analysis of the interview transcripts and an examination of the documents, a number of sub-themes arose or received greater attention than expected from the literature (Table 1 Key themes and sub-themes).

Key themes	Sub-themes	
	Identified in literature	**Emphasised in fieldwork**
The nature of Data	Assessment Data Attendance Data Standardised Test Data Student and Parental Engagement Data Gathering Data Analyse of Data	Student Profiling Data School Planning Data Student Tracking Data
The principal's use of data	Leadership Style Approaches to Using Data Data for Accountability and Improvement Approach to Analysing Data	Approach to Tracking Student Results Approach to Reviewing Examinations
The teacher's use of data	Origins of Teacher's Data Use Assessment Literacy Types of Class Data Used Student Attitudinal Data Special Educational Needs Data	
Organisational influences on use	Professional Development Opportunities to Collaborate The Role of Technology Parents and Student Engagement Security of Data Factors Supporting Data Use Factors Hindering Data Use Outcomes of Using Data	Target Setting

Table 3 Key themes

4.2. The nature of data

4.2.1. Data arising from assessments

The data cited most prominently during the interviews were attendance and examination data which conforms with much of the research literature (Mandinach and Gummer, 2016). In response to what comes to mind when asked about data, for example, BOB-P immediately replied: 'Just attendance, performance…you know…just attendance and performance really'. In all schools, these facets of data were collected systematically and formed a routine part of the school's operation. During the interviews, however, there was a propensity to view the concept of data use primarily in terms of assessment and attendance data, almost to the exclusion of other forms.

In every school, assessment was first referenced in relation to a comparison between school results to national averages. A number of participants (DAN-P, LEO-FG, PAT-P, JOE-FG), did, however, also mention assessment in broader terms. For example, a teacher in JOE-FG stated:

> We would look at attendance data, again, results from various assessments that we use, CAT 4, you know, or various house exams, mock results, you know, we would analyse the assessments there, attendance and those kind of things.'

4.2.2. Data arising from Standardised Tests

Standardised Tests have been growing in significance in Irish Education in recent years (see DES, 2016b, DES, 2014, DES, 2011a) and the Cognitive Abilities Test (CAT4e) was the particular test used in every school. As well as informing interventions, tests were used as a basis to set attainment targets and monitor progress (similar to Lachat and Smith, 2005). From the interviews, however, target setting was based on examination targets rather than based on Standardised Testing (TOM-FG, JOE-P, BOB-P). In all the schools, the CAT4e was used to form a baseline indicator of student's abilities and, in JOE, BOB and LEO (JOE-P, BOB-P and LEO-P), in particular, it was used to form a general impression of whether or not students were performing to their ability. TOM-FG also mentioned the Non-Reading Intelligence Test (NRIT) which assesses students' general ability independently of their reading and was especially used with students with poor literacy skills. JOE-P referred to the Differential Aptitude Test (DAT's) which was used more to identify student aptitudes for senior cycle

subject selection, and in discussions about subsequent training or choosing a career path. Standardised Tests were mainly used to allocate students to mixed-ability classes (ANN-FG, DAN-P, PAT-FG, BOB-P) and to identify students for SEN support (DAN-P, LEO-FG, JOE-FG, BOB-P, TOM-FG, JOE-P). ANN also used Standardised Tests at entry to compare the performance of students from different primary schools (ANN-DP). JOE-P and BOB-P compare Entrance Standardised Scores with student's school assessment in order to evaluate student progress and identify students who may need special attention for under or over performing. The information from the CAT tests was also mentioned in lesson/subject planning (TOM-FG, BOB-P, PAT-P, JOE-FG).

Of note, however, was the fact that, unlike the other schools, none of the participants in TOM or PAT specifically mentioned the STEN Test Scores that primary schools are now required to furnish to post-primary schools. Through an examination of their documents, however, it was found they had compiled this information which may indicate that it may not be highly regarded (TOM-D and PAT-D). PAT was the only school not to mention any data emanating from primary schools. JOE was the only school to refer to the NCCA Education Passport which contains information on the child's interests as well as information on their academic performance, personality, attendance, and special educational needs (JOE-P). PAT-FG and DAN-P referred to IEPs which most schools are also required to have.

4.2.3. Data arising from attendance

Attendance data appeared to be taken for granted (it was not mentioned by DAN-P, TOM-P, LEO-P), except for BOB-P, who described it (attendance) and performance as two of the main forms of data. Taking attendance was also viewed as a function of technology and, in many cases, was the main purpose to which the Management Information System (MIS) system was used by teachers. Attendance was often viewed together with punctuality. Attendance did not seem to merit the scrutiny of other areas with the exception of BOB-P and, to an extent, PAT-P, who emphasised the significance of improving attendance in improving the school as a whole. Attendance is one of the target areas for DEIS so, as DEIS schools, it was not surprising that these schools valued this data and would have compiled such records over time (see DES, 2005).

4.2.4. Data arising from student profiling

Schools are required to maintain details of supports and interventions for students with Special Educational Needs (DES, 2014). It was not surprising, therefore, that data on SEN was cited next most frequently. The detail provided, however, and its use in the commentaries, varied considerably. As coordinating Special Needs provision was often the responsibility of individual teachers or, perhaps, a SEN Department, there were different levels of use and understanding of the information concerned. For subject teachers, this information forms just one part of the planning required for their lessons and, therefore, may not feature as significantly in their considerations. In this research, one member of the TOM-FG had a background in SEN and she was the only one who spoke in any detail about the nature of special needs, learning styles and SEN planning. In her descriptions, she suggested that teachers make very little use of this information, perhaps identifying students with various special needs but rarely, incorporating special measures into their planning (TOM-FG).

Unlike the other schools, participants in PAT and JOE did not mention personal or profile data although they had gathered this information through their application process as a matter of course (PAT-D, JOE-D). This was sometimes referred to in terms of its sensitive nature (BOB-P, BOB-FG, LEO-FG, ANN-DP, ANN-FG, JOE-FG). The level of detail available was a concern for LEO-FG (PPS numbers, Traveller Heritage etc.), whereas this was not a concern for the teachers in PAT-FG. Most of this information was shared with teachers at one of the initial staff meetings of the school year, however, the principal of BOB distributes information in a password-protected file through email before the start of the school year (BOB-P).

All schools mentioned contact with primary schools beyond the transfer of STEN information (see DES, 2014). This usually involved staff from the post-primary school visiting the primary school to discuss the profile of incoming students. The information shared through this process was among the most closely guarded and highly valued (LEO-FG) and included personal information relating to the child such as learning difficulties, their experience of bullying and family circumstances. According to a teacher in ANN-FG, this information was less likely to be recorded on file and was shared verbally when issues arise. LEO also used to seek two samples of the student's work from the Primary School, which was available to teachers to examine (LEO-P, LEO-FG). This, however, has been scaled down because of the volume of material compiled.

4.2.5. Data arising from student and parental engagement

The School Self-evaluation (SSE) Guidelines (DES, 2011b) promoted the practice of eliciting student and parental attitudes for improvement planning. Surveying students was mentioned in all schools and, for many, this went beyond the scope of their SSE planning (ANN-DP, DAN-FG, PAT-P). Most schools cited some level of consultation with parents either through surveys (DAN-FG, PAT-FG, TOM-FG, ANN-DP) or meetings (BOB-FG, BOB-P, DAN-P, JOE-P).

4.2.6. Data arising from School Development Planning

The information in Subject Plans and Subject Department Schemes were mentioned in a minority of schools (TOM-FG, DAN-P, ANN-DP, BOB-P, JOE-FG) and were often spoken about as administrative protocols rather than living documents. This was reflected in an examination of the subject plans which varied considerably in detail, even within schools. This is also noted in the 2013 Chief Inspectors Report which found deficiencies in the quality of planning and preparation with only 81% of Subject Departments inspected having satisfactory planning practices (The Inspectorate, 2013, p.71). The principal of JOE (JOE-P) described his expectation that teachers use their analysis of assessments to inform planning, similarly, DAN-P took this for granted as part of the teacher's job. The principals of the three DEIS schools (TOM-P, BOB-P, PAT-P) valued the information derived for and used in the DEIS plans and DAN-P and JOE-P refer to their School Plans in a similar manner.

Schools are now required to conduct a formal School Self-evaluation (see DES, 2011b, DES, 2012) and, although all schools had a Report and Improvement Plan, it was surprising that only four schools (BOB-P, TOM-P, PAT-P, PAT-FG, JOE-FG) referred to SSE data. Although it has always been a requirement for DEIS planning, SSE requires all schools to gather, systematically analyse and use robust data to inform school improvement planning (see DES, 2011b). The use of data in SSE, therefore, was ignored or overlooked in many of the interviews.

4.2.7. Baseline tracking data

For the purposes of tracking students, BOB-P, LEO-P, DAN-P, ANN-DP, TOM-P and JOE-P arrange entrance information on a single worksheet and, in general, contains:

- Surname
- First name
- Feeder school
- Class assigned to
- STEN scores from the Primary School
- CAT4 scores from Entrance Exam
- A categorised label eg: Below Average, Average, Above Average etc
- Points from exams
- Placing in class

There were three approaches to tracking student performance. For term exams TOM-P, PAT-P and ANN-DP tracked students by their mark in individual subjects but did not find cumulative or average marks to guide their tracking and target setting. They mainly worked on a subject by subject basis. LEO-P and JOE-P used a point's model to allocate points to grades and often worked from the combined total of points achieved in each exam period. Frequently they ordered (sorted) students by scores using these points (Table 4 Junior Cycle Points System) using an absolute order (eg: cumulative points achieved). BOB-P arranged students in the order they appeared in the group (1^{st}, 2^{nd} …) (highest to lowest or visa versa) and students were then analysed in relation to whether they had increased or decreased relative to their initial position. In JOE students were not arranged in such an order, however, a colour coded symbol (↑↓→) appears beside the score to indicate improvement or decline in performance (JOE-P, JOE-D). In BOB, PAT, LEO, TOM and ANN Standardised Scores at entrance were arranged in worksheets which generated a histogram to show the profile of the group of students against the normal distribution curve (BOB-P, PAT-P, LEO-P, TOM-P, LEO-FG and ANN-DP). Comparisons with Standardised Scores were used to identify areas of strength and weakness eg: numeracy/literacy, in individual students and among groups of students. During this research, most of the analysis was undertaken by looking at the results on the computer screen, TOM-P, PAT-P and LEO-P, however, had printed examples which they had used in discussions with staff. LEO-P, JOE-P, DAN-P, BOB-P, ANN-DP were able to spontaneously extract a range of data and generate tables and charts for analysis on the computer, on the other hand, PAT-P and TOM-P, worked mainly from pre-defined tables and analysis. Vague reference was made to other 'soft data' and other profile information available (BOB-P, JOE-P), eg: family circumstances, however, during discussions of these results, other variables from such sources were not incorporated into the analysis witnessed by the

researcher. For the purpose of analysis during this observation period, BOB-P focused less on the absolute totals students got in their exams and focused more on the ranking of their scores relative to their peers (moving from 1st to 3rd position etc). TOM-P focused on whole year group data rather than individual students and ANN-DP focused on data available on VSware. PAT-P and PAT-FG focused on SSE data.

JOE Points (Smyth, 1999)
(Also used by BOB and DAN)

Grade	Level and points		
	Higher	**Ordinary**	**Foundation**
A	10	7	4
B	9	6	3
C	8	5	2
D	7	4	1

LEO Points

Grade	Level and points		
	Higher	**Ordinary**	**Foundation**
A	10	6	2
B	9	5	1
C	8	4	
D	7	3	

Table 4 Junior Cycle Points System

4.2.8. Gathering data

Participants were most lucid about quantitative data, namely assessments (including Standardised Scores) and attendance, while qualitative data such as student profiles or opinions appeared to play a subsidiary or supportive role. The quantitative approach resonated with several principals (LEO-P, BOB-P, DAN-P, JOE-P) with some (BOB-P and DAN-P) describing how they get frustrated by the ambiguity of qualitative data. It should be noted that all schools felt challenged analysing qualitative data while placing a high value on the information obtained from it. 'Soft information' from primary schools or parent's opinion about the school was important but schools found the detail varied and complex on which to base linear plans. One of the main methods of gathering information mentioned in discussions were through online surveys such as Survey Monkey (JOE-P, PAT-FG) or Google Forms (ANN-DP, DAN-P, TOM-FG, BOB-P) which gathered both quantitative and qualitative data. Only BOB-FG, LEO-FG and JOE-P describe gathering information through VSware/Eportal.

The SSE Guidelines (2012) recommended using a variety of methods to gather both qualitative and quantitative data, however, DAN-P and BOB-P were the only principals to describe

conducting Focus Groups in order to gather data. Meetings, in the form of staff discussions (Whole staff, Subject Department, Principal and Teacher) may also be considered as forms of Focus Groups and were mentioned by TOM-P and DAN-FG. Field trips in the form of visits to the primary schools were also mentioned, in the context of data gathering, by LEO-P, LEO-FG, DAN-FG and JOE-FG. Case Studies of students, for example with learning difficulties, were specifically mentioned in TOM-FG. Interviews as part of evaluating the Transition Year Programme and the Induction of First Year students were mentioned in DAN-FG. Discussions with parents either through Parent-Teacher meetings (JOE-P, DAN-P, BOB-FG) or phone-calls (BOB-P) in order to elicit information is also likely to be more common that reported.

Although gathering information through tests was only mentioned by ANN-FG, TOM-P and PAT-FG, test results in the form of state exams, school and class assessments and Standardised Tests were mentioned in discussions about the forms of data all schools found most valuable. Tests of various types, therefore, were among the most common methods of gathering data in schools. Records in the form of Teacher Diaries (BOB-P), Student Journals (JOE-P), Special Reports (DAN-FG), Detention Records (PAT-P) and Tutor Reports (ANN-FG) were also mentioned as other ways of gathering data which may contain both quantitative and qualitative information. As these entities were common features of all schools, they would be available to the other schools as well. It is evident from the responses to the types of data gathering methods used in schools, that participants did not have a comprehensive understanding of, or had not considered, the ways in which they obtain data.

4.2.9. Analysing data

4.2.9.1. Data tools

It is clear from the research in these schools that a variety of data was analysed and different approaches were used. From an examination of school records, observations and participants responses, the scope of the analysis and number of variables considers was quite limited, for example, exam results were mainly disaggregated: by Name, Subject, Teacher and Grades, but not factors such as attendance or SEN. LEO-P was the only one to describe comparing attendance with exam performance but other factors such as Early School Leavers, ethnicity, gender, student perceptions, parental engagement and class assessments were not described or included in any analysis. Bernhardt (2013) posits that considering the broader contexts of

teaching and learning ensures richer and more nuanced understandings while ignoring data limits potential for improvement.

Much of the initial data was analysed using some form of technology. In most cases this was VSware (BOB-P, PAT-FG, ANN-FG, ANN-DP) or ePortal (DAN-P, JOE-P) and often these MISs were only used to monitor attendance data, although they have many more features. In general, teachers underutilised the technology and most were unfamiliar with the programme other than the immediate data entry and rudimentary presentation features. This reflects Murray's (2013) assertion that although school systems have access to more data than ever before, most educators lack the skills to use the data for school improvement. It was evident also in the replies that teacher's conception of analysis amounted to little more than monitoring, for example, of attendance. PAT-FG: '…so now with VSware, which is brilliant, you'll have a visual of their attendance, their punctuality, the number of classes they've missed'. Although, it is not surprising that attendance was recorded through technology, using other technologies such as online surveys ie: Google Drive (ANN-DP, DAN-P, TOM-FG, BOB-P) and Survey Monkey (JOE-P, PAT-FG) and MS Excel presents a greater degree of sophistication. By way of explanation, the use of MS Excel extends between two extremes with ANN, PAT and TOM appearing just to use the PDST Examination Comparison Spreadsheets (ANN-FG, PAT-FG, PAT-P, TOM-P and TOM-FG) while DAN, LEO, BOB and JOE used some of the filtering and analytical functions of the programme (DAN-P, LEO-P, BOB-P, BOB-FG, JOE-FG and JOE-P). In the latter cases, the use of Excel was driven by the principals who were very comfortable using Excel and were interested in exploring the features of the programme to extract greater insights from their data. In these four schools, much of the initial analysis was undertaken by the principals who then distributed their analysis of examination results to staff.

All the schools had moved or were in the process of moving from using Advanced Learning 'Facility' MIS to VSware and the overwhelming reason cited was ease of use and presentation. Wayman (2005) described the user-friendliness of MIS as critical to their effective use. JOE-P, however, who was extremely proficient in using Facility, was very sceptical about the programme and does not believe it can provide the level of analysis schools will need going forward. ANN-DP was the only person to go into detail on how they use the programme (VSware). He used it to report the attendance rates and absence types, provide profiles of absenteeism, year group breakdowns and authorised and unauthorised absences through a range of graphical presentation (other MIS offer similar functions).

4.2.9.2. Staff involvement

In most cases (LEO, BOB, DAN, JOE, ANN) the data described by participants was gathered under the stewardship of the principal with LEO-P indicating that some committees gather data of their own and TOM-P suggesting that she coordinates the collection of data with sub-committees. In three schools (LEO, BOB, JOE), the principals, essentially, analysed most of the information themselves while in the other schools there were various degrees to which other staff members were involved. Participants in DAN-FG and BOB-FG appreciated that the principals did much of the mundane data entry and analysis. This was also the view of their principals who believed teachers are busy enough,

> BOB-P: I don't think the teachers need to be bothered with the spreadsheet side of it, I think they need a real understanding of what they can do about situation…
>
> DAN-P: they only have so much time and commitment that they want to give to this and if you overburden them, you're going to lose them. So our job is to facilitate the gathering, the analysing, the feedback, the actions and make their life easy to implement these actions.

ANN-FG and LEO-P describe how Year Heads did a degree of analysis in relation to their own class groups while TOM-P described how much of the analysis was done in committees and whole staff meetings. Most of the principals (ANN-DP, LEO-P, TOM-P, BOB-P, DAN-P) described consulting groups, such as the Care Teams or Career Guidance Counsellors, as part of their deliberations. Once the initial data had been filtered and analysed in most schools, it was usually distributed to relevant groups such as Year Heads, Tutors or sub-committees of teachers (LEO, PAT, BOB, DAN, JOE) for actions. The participants from ANN-FG and PAT-FG describe a greater degree of dialogue subsequently, between the principal and sub-committees, once they had the information to digest for a while.

Unlike the other schools, in PAT, a teacher had much greater power directing the data gathering, analysing and presenting the evidence as part of the School Self-evaluation process (PAT-FG, PAT-P). This teacher did the initial statistical analysis which was then discussed with the principal with whom she then, jointly, made presentations to staff and Board of Management. PAT and BOB, meanwhile, also had a teacher who had responsibility for monitoring and improving attendance and BOB-P indicated that this involved analysing patterns and, together with management, devising action plans (PAT-FG, BOB-P). JOE-P and DAN-P described calling on the expertise of staff, such as Guidance Counsellors or SEN

teachers, to interpret some of the data and present this to staff. Five schools reported some form of staff discussion as part of the analysis process; either Subject Department (DAN-FG, PAT-P, TOM-P), Whole Staff (DAN-P, PAT-FG, BOB-P, TOM-FG), Middle Management (BOB-FG, JOE-P, JOE-FG) or Focus Group such as the Care Team (DAN-FG, PAT-P, TOM-P). BOB-FG and DAN-P were the only schools to mention including parents when analysing and DAN-P also included the Student Council and Board of Management.

4.3. Principals use of data

4.3.1. Approach to using data

It was apparent from the Focus Group interviews with teachers how prominent the principals were in promoting the use of data in decision-making, although one principal (DAN-P) objected to the notion that he was 'driving' it and preferred to be regarded as 'leading with data'. If fact, several groups of teachers regarded their principals as 'pioneering' (LEO-FG) the use of data (JOE-FG, BOB-FG). Moreover, three focus groups (DAN-FG, LEO-FG, JOE-FG) were amused by the detail their principals went to, with one school describing the principal as having 'a black belt' in statistical comparison (LEO-FG). In these three schools (LEO, DAN, JOE) and BOB, the principals were also characterised by their openness to share data by their Focus Groups. Distributed Leadership was another feature of the principal's influence in all the schools in this research which was particularly manifest in how the findings of data were dealt with. In ANN and JOE, in particular, this was through a formal hierarchical structure; usually from Principal to Year Heads to Class Tutors. By comparison, however, in PAT a substantial amount of the analysis was carried out by a nominated teacher, while in TOM the analysis and implementation centred on working groups, including Subject Departments.

> I don't need to know everything and you've people heading up the different core teams and different subject areas, and they take that responsibility and feed it back, so I don't really need to be in ...you know, let them ... give them the responsibility and the trust, trust in them that they'll do it, you know. (TOM-P)

Principal openness regarding data and distributed leadership are critical success factors also identified in literature (Hoogland et al., 2016, Park and Datnow, 2009). It was also evident from the interviews that several principals (LEO-P, BOB-P, DAN-P, JOE-P) had an affinity with statistical analysis:

> I'm a non-believer in all things spiritual and otherwise. I'm a man of facts, I'm a science man. It either is or it isn't. It's logical or it's illogical. There's no halfway house. I don't believe in spirituality or things like that. So if it exists, prove it to me. So I'd be basing the fact that I'm not interested in stories and emotions and I'm not interested in anecdotal information. I want to know is it or isn't it. Show me the data basically'. (DAN-P)

> She (the principal) does think in very organised ways and she does think in figures, but she actually really understands communication (BOB-FG).

> Concurrently, BOB-P, describing her thinking process, said 'It's usually numbers for me' (BOB-P).

4.3.1.1. Principal or organisational centred analysis

The four same principals, with whom the analysis of data was very principal centred (LEO-P, BOB-P, DAN-P, JOE-P), were also very proficient at using computers for analysing statistics. PAT-P, on the other hand, confesses not to be good with statistics;

> I don't have an emotional relationship with the numbers, so… okay, so there's a load of data there, right, so then when I'm looking at the thing, ….I kind of disregard it in a way and I'll say what's the bit that I need and where can I find that bit. (PAT-P)

There was a divide, therefore, between those highly technically proficient leaders who proactively scrutinise data to identify priorities for action (LEO-P, BOB-P, DAN-P, JOE-P) (from examination of school documents and processes ANN-P displays many of the same characteristics) and the two principals who approach data through organisational priorities first and then look at data to guide their planning. This was also reflected in the analysis being either principal centred (LEO-P, BOB-P, DAN-P, JOE-P) or the analysis being highly distributed (TOM-P and PAT-P). TOM-P uses a committee system to gather, analyse and plan with data while PAT-P predominately has a designated teacher scrutinise the data with her. Understanding the capacities of technology and personal proficiency in computers are, however, increasingly becoming a prerequisite for modern school leadership (Parylo and Zepeda, 2014). LEO-P described himself as looking at the analysis from a 'global' perspective while the teachers were the 'foot-soldiers' delivering the results:

> You're looking at these (exam results) for the management mostly, which are more about percentages taking higher level, so it's a more global thing, I wouldn't be necessarily commenting on the subject departments (LEO-P).

4.3.1.2. Origins of principal's use of data

The origins of these principals use of data varies; DAN-P said his use was based on his factual nature while LEO-P described himself as a bit of a 'Geek' when it came to statistics and computers. Both of these principals described their dissatisfaction with discussions based on anecdotes. JOE-P and PAT-P indicate that their interest in using data developed over time and with experience. Meanwhile, DAN-P, PAT-P and BOB-P attribute some of their understanding to training, either their primary qualifications in business (BOB-P) or science (DAN-P) or post-graduate training in Special Needs (PAT-P). LEO-P and JOE-P developed their practices from a desire to improve student achievements. BOB-P moved from a small to a large school and found analysing data was a way of getting to know her students; this aspect of using data was also noted by LEO-P, ANN-FG and DAN-P. JOE-P described a scenario where he wanted students to take more responsibility for their learning so he developed a tracking system as a means of making students more accountable for their own progress. JOE-P: 'The student would have come in with their target setting sheet of what they want to achieve and then the student would have been asked to conduct a little piece of self-evaluation themselves' and plan out what they needed to do to achieve their desired grade.

BOB-P also described herself as a bit of a 'control freak' and said: 'I wanted to know how every child was doing…you know…even if I didn't know the child, …I would be able to look it up and say he's doing well'. JOE-P and BOB-P use a points system developed by the ESRI (Smyth, 1999) which attributes points, from 1 to 10, to Higher and Ordinary Level grades. LEO-P uses a similar approach. They use this system to compare exam performance latterly across year groups and longitudinally over years and is key to their tracking students.

There was no single reason why these principals began to engage with data in the manner they have; in fact, their comments were an indication to the multifaceted properties data use offers to school leadership. While an inclination towards mathematics was prominent and, perhaps advantageous, it was not a prerequisite for data use. Although training did play a part, it was the potential data offered to solve problems, manage the organisation and improve attainment that were the significant motivators.

4.3.1.3. Ensuring the quality of data

Several principals spoke about managing the workload involved in using data and, in doing so, were concerned about ensuring the quality of the data and the process. JOE-P, DAN-FG, BOB-FG and BOB-P were all conscious that a flawed gathering and analytical process would undermine the trust necessary to use data well. Both BOB-P and JOE-P emphasised the necessity for clean data.

> You can't afford to have contaminated data, just because you haven't put the list in the right sort order or you haven't matched it. Especially ...when you're giving out information to teachers, they tend to be combining a number of pieces of information from a number of different places and then it's crucial that they match up (JOE-P).

JOE-P, who wrote a dissertation on MIS, articulated concerns about how data was used in Ireland. He lamented that the existing MIS programmes (ePortal and VSware) do not have a comprehensive range of analysis features and has had to resort to using Microsoft Excel. He described his frustration at the absence of a coherent approach to the use of data in schools by the Department of Education, which would make examination data, in particular, more accessible. This was echoed in comments by DAN-P who was concerned at the increasing administrative burden on school management. JOE-P suggested the presence of a Data Coach in schools is a significant support to management and teachers in that system (see Marsh and Farrell, 2014).

4.3.2. Data for accountability and improvement

Using data could be represented as a dichotomy between accountability and school improvement where the former is about improving school effectiveness by identifying its strengths and areas for improvement while the latter involves holding the various stakeholders responsible for their contribution to student learning (Visscher and Coe, 2013, Wrigley, 2013). Three principals (JOE-P, LEO-P, DAN-P) described dealing with teachers with whom students underperformed in comparison to expectations. Problems were highlighted from analysis of the state exams and, in the case of JOE-P and LEO-P, the results data formed the basis for the subsequent discussions with the teachers involved. Most of the principals (ANN-DP, LEO-P, TOM-P, PAT-P, DAN-P) reported that they monitor the performance of teachers through examination results, but this was more to keep themselves abreast of what was happening in classrooms rather than as a basis for dealing with underperforming teachers.

> We would drill down into it and you know.... you basically look at performances of individual teachers within departments and strengths and weaknesses and you know, with a view to trying to help people (ANN-DP).

In line with Looking at Our Schools (DES, 2016e) which seeks to discuss the performance of individual teachers, BOB-P, TOM-P, ANN and DAN-P, also describe meetings with Subject Departments or individual teachers to review the performance in those subjects. TOM-P meets every teacher, individually, to discuss school priorities, CPD, teacher/principal concerns and student performance at the end of the year. The findings of these discussions were compiled and discussed by the principal at the first staff meeting in August. Indeed, all of the principals emphasised the role of data in improving student performance rather than as an accountability mechanism for teachers. As indicated by Valli et al. (2007), this course of action may be prudent as using data to focus on teacher performance can adversely affect the promotion of DIDM as well as other improvement efforts. BOB-P described how she felt the staff were suspicious about her initially but were more comfortable with her now because she was very open with the data she shares with them. Similarly, JOE-P stated:

> You have to socialise people into it (analysing results) and you can only do that by making it a non-threatening environment, right, where it's not perceived there's high stake outcomes here. If it's perceived from the outside its high stakes outcomes, you may get distrust built up from the staff and that's a very dangerous thing to do.

As well as tracking how well students were doing based on entrance and term tests, the schools projected performance targets that students were expected to achieve. Indeed, some of the principals manage the discussions with students themselves, especially selecting target grades in the Leaving Certificate (LEO-P, BOB-P).

Those schools that were in the DEIS programme (TOM, BOB, PAT) are required to have school targets for exam attainment as part of that scheme and TOM-P describes this as follows:

> You can gather the data for the number of students, say sitting Higher Level, say in subjects at Junior Cert or Leaving Cert, well, I mean if you've the data you can set targets for improvement… that the subject planning teams can have a discussion how they can increase the number of students- the attainment. Not just the attainment but also the numbers doing Higher Level. So it's extremely important, same with attendance, same with progression to third level, you know you can measure it very easily, say with literacy and numeracy, you know so they influence, I mean they really have....they are a major factor in what decisions you make, what strategies you put in place and then how you're going to measure them ... (TOM-P)

In a similar manner, DAN-P also described having targets for Subject Departments, especially to increase the proportion of students performing at Higher Level. BOB-P mentioned more individualised target setting eg: attendance with particular students but on a less formal basis. From a different perspective, ANN-DP described it as 'unhealthy' to focus very closely on particular groupings of students, preferring broader attainment targets because 'data can be used to excuse performance as well'. DAN-P also spoke about Subject Departments forming long term strategies:

> I'm looking for, where do you see yourselves five years down the line? Where do you see yourself in terms of.... if you're French or Spanish, an international exchange? Some event or activity. I want you planning for maths week. So I'm looking at longer term strategies in there.

BOB-P and TOM-P also spoke about review meetings with their Subject Departments to discuss activities and review the performance of students. Furthermore, almost all the principals (ANN-DP, LEO-P, TOM-P, PAT-P, BOB-P, DAN-P) mentioned the need to look beyond statistics and raw data.

> Soft information that helps in the make-up of classes…that this guy has been bullied for the last few years … there are other issues as well and then like autistic children, like how does it manifest itself ... I type all that up and I give it to next year's Year Head and myself, I don't give that to anyone else cause there is an awful lot of information' (BOB-P).

ANN-DP uses the example of seeing 'how teachers are actually coping'. LEO-P described that he was 'more interested in the narrative that goes with (data)'. While DAN-P describes that there has to be 'a bit of give and take as well, like at the end of the day, I'm not a robot, I hope'.

4.3.3. Approach to tracking student results

Visscher and Coe (2013) describe the improvements in outcomes from monitoring and analysing student assessments and (Smith, 2005) suggests that this is even more productive if schools can demonstrate the 'Added Value' they contribute to student performance. LEO-P was the only one to use the term 'Value-added' in his interview, however, practices involving monitoring student results from when they entered the school to when they left was described by most of the principals. JOE-P was the only principal, however, who was able to describe the difference the school made to a student's results over time. Indeed, it appeared that none of the schools had gathered the statistics for the purpose of demonstrating this phenomenon

and none of the principals, including LEO-P and JOE-P, were able to produce any evidence of the valued added to student performance.

BOB-P, LEO-P and DAN-P mainly worked from prepared spreadsheets that had a degree of similarity, ie: worksheets of entrance scores, exam results etc. In all cases, however, there were variations which indicate that the principals were continuously modifying their approaches and adapting the format depending on the type of information they were trying to extract (eg: variations in layout, format etc). The approach of JOE-P was quite different. He mainly worked from the ePortal database and, depending on the information required arising from the discussion, he extracted the specific variables required and in a preferred format at that time. In his case, therefore, there was no standard layout to data presented. Whereas the approach used to analyse data in BOB-P, LEO-P and DAN-P followed a similar pattern to before, there were multiple permutations to what data JOE-P choose to include and how it was configured and presented. BOB-P, LEO-P, DAN-P and particularly JOE-P, were able to filter results to narrow the selection in order to examine results in more detail. BOB-P focused on student's relative position in the class with reference to previous exams (Appendix V). She justified this by saying she was more interested in whether or not students were making progress (or not). Four principals: LEO-P, JOE-P, DAN-P and BOB-P, in particular, used the computer functions to automatically calculate averages, totals etc., and conditional formatting was used to insert symbols (↑↓→), highlight figures or shade cells (Appendix V).

The approach to tracking was similar in most schools (BOB-D, JOE-D, DAN-D, LEO-D and ANN-D), term tests were compared initially to the different categories in the CAT4e Standardised Test administered at entry. Two of the schools (BOB-D and JOE-D) had four continuous assessments; Halloween and Easter were classroom tests or assignments while Christmas and summer were more formal. To examine the results most principals disaggregated the marks by subject, teacher, and level (LEO-P, TOM-P, ANN-DP, JOE-P, DAN-P and BOB-P). Depending on the information they were seeking, they would analyse the datasheet through the frame of each category, eg: disaggregated according to student to evaluate where students were preforming well or not, declining or improving etc. Principals did not write their conclusions in any detail, if at all. Usually, these were formed into presentations for teachers and the Boards of Management (LEO-P, TOM-P, PAT-P, DAN-P and BOB-P). Although all the schools tracked student performance, substantial value was realised when it was used as a basis for setting targets for student performance. One of the

other main functions was to identify students who were underperforming in order to take remedial action; this usually involved a discussions with Year Heads, possibly directly with the students themselves and occasionally in meetings with parents. Arranging the student results in the manner described enabled schools to evaluate the nature of their mixed ability classes (ANN-DP, JOE-P, DAN-P), monitor teacher performance (ANN-DP, JOE-P, LEO-P, TOM-P and DAN-P), inform discussions about SEN (JOE-P and DAN-P) and acknowledge student achievement (BOB-P). An opportunity to integrate with other forms of data, such as attendance or social background, was not realised in a formal way in any of the schools.

4.3.4. Approach to reviewing examinations

There were two approaches to how reviews of exam results were conducted by principals. The first involved comparison of school and national results; these tended to be summaries, retrospective in nature, whole school or Subject Department focused and served, mainly, for information purposes. In these scenarios, annual examination results did not tend to be used to set targets for the subsequent year, however, TOM and DAN were an exception to this as they set targets around improving take up at Higher Level (TOM-P and DAN-P). Annual targets for each subject in TOM were based on a range of data including entrance and term assessments. LEO-P and TOM-P, in particular, had a range of printed material readily available on exam performance and was usually used to promote or celebrate school achievements.

The other approach was based on Junior Cycle results and occurred when students' results were incorporated into tracking student performance in Senior Cycle (LEO-D, ANN-D, BOB-D, JOE-D, DAN-D). Although there was a review following the publication of the exams results in September, these results were used in a formative manner as a basis for student performance and improvement from Fifth Year. Leaving Certificate results, therefore, were used summatively while Junior Cycle results were used as though part of a Continuous Assessment system.

Although the national figures were available in TOM, school targets for Higher Level sought to outperform internally defined targets rather than national averages (TOM-P). As a DEIS school with a high proportion of students from disadvantaged backgrounds, national averages appeared unrealistic to attain. This was also the case for the other DEIS schools; PAT and BOB, however, they had a much greater number of high-achieving students. The opposite

situation appears to occur in LEO where they consistently outperform national norms at entry and in exams. Again, more for publicity and celebration, LEO-P tracked performance in exams over a number of years, against national averages, which created an excellent impression of the school.

It was notable that principals in every school left the post-examination analysis (using the PDST Spreadsheets) to the Subject Departments, ie other than having the secretarial staff fill in the raw scores (LEO-P, JOE-P, PAT-P, BOB-P), they did not guide or get involved in the process. Subject Departments had to produce a report for the principal; however, principals did not tend to follow up on their findings subsequently.

4.3.5. Approach to analysing attendance and behaviour

Several other types of data and approaches were used to demonstrate the analytical processes engaged in by the various schools, however, the potential of the MIS systems were only demonstrated, in any detail, by ANN-DP and JOE-P. Although attendance was described as a contributing factor in performance in several schools, ANN-DP was the only leader to show any analysis of attendance or behaviour. Even then, most of the commentary from ANN-DP focused on the interventions rather than analysis of the data. ANN-DP described a daily routine of monitoring the morning and afternoon attendance, checking for overdue roll calls and absent students without leave. These, together with dealing with reports of misbehaviour, transmitted through the system, appear to be the most regular use made of the MIS, not only by ANN-DP but the other principals as well. After certain periods (eg: end of term), for specific purposes (NEWB returns, BOM Report), should a pattern become apparent or an incident occur, then ANN-DP would conduct an analysis of data using the MIS system. In general, these reports presented the raw numbers for attendance and misbehaviour, any patterns over the period (times of the day, days of the week, etc) and profiles of the main culprits involved (individuals, groups or classes). The discipline was subdivided by the nature of the negative and positive behaviours (incomplete homework, smoking etc.). Although the analysis of behaviour and attendance often occurred at the same time and following a similar approach, the two datasets were not integrated (in ANN or elsewhere). With the exception of LEO-P, neither was this information cross-referenced with student attainment or progression data to, perhaps, identify any contributing factors. Having discussed and analysed the information together among the staff, interventions were then proposed to address the problems (ANN-DP and ANN-FG).

4.4. Teacher use of data

4.4.1. Types of data used

When asked to describe the main forms of data teachers use, most participants primarily referred to attendance, punctuality, assessment and behaviour data. Assessments referred to whole-school term assessments rather than routine class assessments. In addition to this list, there was a large discrepancy, between schools, in the other types of data participants considered. LEO-FG and JOE-FG, for example, referenced the information from primary schools at the start of the year. JOE-FG also included student events and DAN-P referred to Subject Department data such as details of subject content, books, homework, class lists and events. The responses indicate a simplistic definition of data, usually focused on school mandated information and often perceived in terms of what was gathered through the MIS system (ePortal or VSware) (ANN-FG, PAT-FG, BOB-P, TOM-FG). ANN-FG, LEO-FG, TOM-P and JOE-FG, described themselves as still coming to terms with the MIS for gathering, storing and sharing data, whereas LEO-FG regarded it as routine and straightforward. Other data such as student exam targets etc. seemed to be gathered and distributed through a hierarchical structure in many schools: from Tutors to Year Heads to Principal and vice versa (ANN-FG, DAN-FG, DAN-P, LEO-FG, JOE-FG, PAT-P, BOB-P). ANN-FG and JOE-P point to the requirements on teachers to maintain their own classroom data, such as attendance, and then notify the Year Head should issues arise with students. When asked, DAN-FG, LEO-FG, JOE-P, PAT-FG and BOB-FG described the main use of data by teachers as Subject Department Plans, Parent-teacher meetings, and sharing plans with the principal, as opposed to their own lesson planning. Several participants (ANN-FG, ANN-DP, DAN-FG, PAT-FG, BOB-P) mentioned sharing subject schemes and resources through the school network or online, while, DAN-P said some of these resources were shared with students as well. ANN-FG, PAT-P and BOB-P described the value of soft-information, such as relating to bullying, emanating from teachers and tutors at classroom level. DAN-FG and JOE-P mentioned the increasing role of email in recording and communicating important information. Meanwhile, ANN-FG and JOE-FG had detected a noticeable change in emphasis from sharing behaviour to academic data over recent years.

4.4.2. Origins of teacher's data use

In all the schools the teachers emphasised the key role of the principal in promoting the use of data. In addition to this, participants in DAN-FG, JOE-FG, PAT-FG and TOM-FG valued the professional conversations, particularly through the 'Croke Park[1]' hours in sharing an understanding of data, and its potential value in teaching (DAN-P, JOE-FG, JOE-P, PAT-FG, TOM-FG).

Only one participant said they had any specific training in data use (Special Needs) and she described that as inadequate (TOM-FG). She also said, in her experience, teachers were not capable of analysing data effectively, for example, the implications of standardised test scores. On the other hand, teachers in DAN-FG believed that teachers could do so adequately well, while in JOE, a teacher qualified as a psychologist, was able to provide training to staff on Standardised Tests and their implications for teaching (JOE-P, JOE-FG). Similarly, in the case of ANN and PAT, the expertise of teachers was used to provide this training to the rest of the staff on certain related topics (ANN-FG, PAT-P). In ANN-FG, a teacher researched types of MIS and then trained the staff, and in PAT-FG a teacher received training in SSE and provided training to staff as part of leading the roll out of SSE in the school.

Datnow and Hubbard (2016) found teachers' beliefs about data and their capacity to use data are related, emphasising the necessity to focus on developing analysis skills and having the opportunity to collaborate with data, for example, through SSE. All schools made some reference to School Self-evaluation (see DES, 2012, DES, 2011b) but it was regarded more from an accountability perspective than improving teaching and learning. Although, DAN-P maintained control of gathering the information, the analyses and proposals for action was devised by the SSE team. In TOM-P, again, it was a working group of staff which gathered and analysed information and devised an initial plan. In all schools, the principal or coordinating group took a minimalist or terse approach to the SSE process and, consequently, teacher's engagement was limited. In terms of teachers data use, JOE-P believed that the majority of teachers did not clearly establish objectives for their classes and they were not used to reflecting on learners or targets and needed to build up this expertise. He described this as

[1] The provisions of the Croke Park Public Service Agreement provides for an additional 33 hours per school year. These hours are allocated to non-class contact activities which would previously have necessitated a school closure / half day.

'the language' to use data. On the other hand, DAN-P believed teachers didn't realise how often they were using data in making decisions.

Other enablers of data use, cited by participants include: the requirement on teachers to analyse their own results (PAT-P), teachers professional attitude (TOM-P, JOE-P), ease of access to data (JOE-FG, BOB-FG), having to respond to student targets (PAT-FG, JOE-FG), teachers being aware that data was being monitored (LEO-P), and seeing the benefits of using data (PAT-FG, BOB-FG, JOE-FG, JOE-P, TOM-FG).

4.4.3. Comparisons with State Exams

Participants from all schools described the requirement of teachers to review the state exam results of their students, but, the approach taken varied between schools. LEO-P, JOE-P, PAT-P, BOB-P described how the raw data from the exams were already summarised for teachers and they had to respond to these, whereas in ANN, TOM and DAN the teachers had to do all the analysis for themselves (ANN-FG, TOM-FG and DAN-FG). The teachers in all the schools had to consider the implications of exam analysis in their planning, yet, several principals were sceptical whether teachers genuinely engaged with this; ANN-DP and JOE-P assumes they do but PAT-P, DAN-P and JOE-P said they didn't believe many teachers did. LEO-P, who compared state and house exam results stated that teachers were marking more accurately and consistently from their experience analysing school and state exams. DAN-FG, DAN-P, LEO-P, JOE-P, PAT-FG, BOB-FG, BOB-P and TOM-P described much of this analysis taking place, collaboratively, at Subject Department level, but again, DAN-P and TOM-P were unsure if this led to changes in department schemes or teacher's plans. Although many teachers lauded the value of time spent collaborating (DAN-FG, JOE-FG, JOE-P, TOM-P), it would appear that data was not prominent at these settings, other than discussing state exam results at the beginning of the year. In fact, ANN-DP, DAN-FG, DAN-P, LEO-FG, JOE-FG and BOB-P stated that discussions involving data mainly occurred at management and/or Year Head level rather than among teachers.

The Subject Departments in most schools (BOB, DAN, TOM, PAT, ANN) used the PDST Examination Analysis Spreadsheets to analyse results while LEO and JOE used similar but simplified versions (BOB-FG, DAN-FG, TOM-FG, PAT-FG, ANN-FG, LEO-FG, JOE-FG). Teachers added the results of all the students in their subject and compared their results to the national averages in terms of levels (Higher, Ordinary or Foundation) and grades. They also

used the features of the program to examine trends in results over five years. The Subject Departments in each school wrote their reflections in a report that was added to the Subject Department Planning Folders and submitted to the principal. The detail of the report (and analysis) varies enormously, some were little more than regurgitated descriptions of the charts or trends (TOM-D, PAT-D) while others were simplistic explanations of the results such as indicating several weak or unmotivated students (BOB-D, ANN-D). Reference was made to rates of absenteeism but these were rarely backed up with figures. Several teachers compared their student's results and were able to indicate the number, for whom, their highest mark was in that subject (LEO-FG). None of teachers, nor in any of the reports examined, did teachers take responsibility for their part in the student outcomes. Whereas most of the reflections were insufficient bases for improvement plans, several teachers described actions, such as adjusting the timing of course work, teaching approaches or putting greater focus into exam preparation in order to improve student performance in future (BOB-D, LEO-D, DOM-D). There was no evidence of cross-referencing with other data such as class or term exams, attendance etc., although they were available. Several teachers (TOM-FG, DAN-FG, ANN-FG, PAT-FG) described comparing results for their own students separately to the Subject Department for their own interest and were not required to do so by management.

4.4.4. Class assessment data

Teacher's perceptions of class assessment data was of formal substantial tests. None of the teachers referred to project work, essays, assignments or any form of oral presentation in the context of assessment. Whereas several participants mentioned Assessment for Learning (PAT-FG, BOB-FG, TOM-FG) none of them described using course-work formatively. Whereas setting common tests occurred in most schools (ANN, DAN, LEO, BOB, TOM), only participants in TOM-P, DAN-FG and JOE-P stated there was some form of cross-moderation and even then it usually involved comparing marks rather than examining students work (ANN-FG, DAN-FG, LEO-FG, BOB-FG, TOM-FG, BOB-P, TOM-P). The test designer in LEO, for example, is also required to set a common marking scheme (LEO-FG). JOE-P was particularly aware of the discrepancy in comparing school results with state exams when there was no approach to standardised marking between teachers in a Subject Department. He also suspected teachers may alter results in order to avoid being out of sync with colleagues! JOE-P, TOM-P, BOB-P and DAN-FG mentioned teachers using assessment information in a formative manner with PAT-FG describing this as a required feature of subject planning. The

detail of how assessments were used, formatively, by the participants in this research, however, was extremely vague in all cases.

Analysing student performance and helping them to set target grades in their various subjects appeared to be the most intricate data analysis teachers engaged in yet teachers were only involved in this in a minority of schools. These teachers tended to have posts of responsibility, such as Year Heads in ANN, JOE and TOM or Class Tutors in DAN (ANN-FG, JOE-FG, TOM-FG, DAN-FG). Teachers had a mentoring role in BOB and PAT (BOB-FG, BOB-P, PAT-FG) but class teachers were not involved in any of these discussions with students in LEO (LEO-FG). DAN-FG, LEO-P and PAT-FG described teachers reviewing results with students, after exams, in their own subject but not as part of the formal tracking or target setting system. JOE-P and TOM-FG stated that some tutors take on a mentoring role of their own accord and were not required to do so but JOE-P described an alternative scenario where teachers avoided taking responsibility for student performance.

4.4.5. Special Educational Needs data

SEN information is one of the main forms of data teachers get that is directly related to the performance and the educational needs of their students. Although it designed be used in lesson planning to help cater for student needs, it got little attention in any schools and was often ignored completely. ANN-FG, LEO-P, JOE-FG, BOB-FG and TOM-P described how all teachers were informed about the Special Educational Needs of students at the beginning of the school year. DAN-FG, LEO-FG, LEO-P, JOE-FG, JOE-P, PAT-FG, BOB-FG, BOB-P and TOM-FG described how this information was available throughout the year, should teachers wish to access it, however, LEO-P described teachers as having ‘enough to be doing’ without going through the file. A teacher in LEO-FG described the SEN information given at the beginning of the year as ‘daunting’ and felt under pressure to know this information. Similarly, in their research, Shevlin et al. (2013) found inadequate time was allocated for lesson planning, staff liaison or collaboration in relation to Special Education Needs, and there was a lack of understanding or even acceptance by teachers to adapt or differentiate to student’s needs. A teacher in JOE-FG said some of the information was on a 'need to know' basis while one teacher in TOM-FG said, although it was available, it was not used. On the other hand, teachers in DAN-FG, LEO-FG and JOE-FG said that they used this information to inform their schemes of work and BOB-P stated that she expected the teachers to do so. ANN-FG describes

how teachers tend to decide what to do as the year goes on, based on their experience, rather than referencing Standardised Assessment such as the CAT.

Teachers in TOM-FG and JOE-FG stated that they received some whole-staff training on how to deal with the different learning styles of their students but another teacher in TOM-FG said that further training was required on analysing SEN data and the implications for lesson planning. Smith and Thomas (2006) state that specialist training on planning the curriculum is often required to suit different types of SEN. ANN-FG, DAN-P and TOM-FG stated that the SEN/Guidance Departments were the main users of data among the staff.

4.4.6. Student attitudinal data

JOE-P stated that some teachers survey their students informally but this was not expected, whereas, PAT-P encourages this practice and requires all post-holders, in particular, to survey relevant people in relation to their posts. Similarly, BOB-P conducts an annual survey about teaching and learning among students and distributes the results to staff but she filters the responses, however, to avoid embarrassing any teacher (BOB-P, BOB-D). Teachers in TOM-FG were encouraged to undertake attitudinal surveys of students as part of a process of self-evaluation and one of the focus group teachers described how she asks students if they liked or disliked the activities she uses. She was unsure if many other teachers engage in this practice as teachers or Subject Departments do not generally share or discuss their findings. The JOE-FG teachers also reported survey fatigue in their school although most of the surveys were conducted by management or sub-committees. Kennedy and Datnow (2010) describes how consulting students about teaching and learning helps them become more active participants in their own learning.

4.4.7. Teacher's attitude towards using data

One teacher from ANN-FG and another in LEO-FG said that teachers were beginning to see the merits of using data in school although DAN-P said teachers were not using data effectively and teachers in PAT-FG and TOM-FG said there was a negative or ambivalent attitude towards using data. PAT-P describes an outdated attitude of 'teacher knows best' that values one's experience over the opinions of students and other data. Several participants indicated that a cultural change was required (ANN-FG, LEO-FG, LEO-P, JOE-FG, JOE-P) but this was beginning to happen (BOB-P), in some cases, teachers were even coming to the principal seeking out information (LEO-P, JOE-P). On the other hand, teachers in LEO-FG and BOB-

FG highlighted the problems of data overload. DAN-P, TOM-P and a teacher in ANN-FG mentioned certain teachers feeling pressure arising from principal's scrutiny of examination results, meanwhile teachers in LEO-FG did not think teachers felt under any additional pressure to perform. A teacher in JOE-FG said the pressure was more on the students as a result of their approach to tracking and target setting which concurs with statements from the principal (JOE-P). PAT-FG, TOM-FG and DAN-FG describe the emphasis placed on national averages as disheartening for many teachers who were trying their best.

JOE-P said those teachers who do not engage with data display similar traits; they want to work in isolation, deliver a syllabus at their pace and not the students, but the main characteristics are that they are not reflective and are not student orientated, 'they're not there for service delivery to the children. It's a job for them, let me in, get it done, get me out.' DAN-P and PAT-P spoke in similar terms.

4.5. Organisational influences on data use

4.5.1. Opportunities to collaborate

Wayman et al. (2012c) suggest that establishing clear goals and expectations for collaboration, providing structured time with data and fostering a collaborative environment are important factors in promoting data use in schools. Data such as results and targets help provide a focus for Subject Department planning meetings (JOE-FG, TOM-FG, JOE-D) and, in some cases, form the basis for discussions on appropriate teaching methodologies (JOE-FG). Personnel in all schools described working together in Subject Departments, in committees and collaboratively making subject plans was highly valued in some schools (JOE-FG and DAN-P). Most schools (JOE-FG, PAT-FG, TOM-FG, TOM-P, DAN-P) referred to specific occasions where groups of teachers worked together and focused on data such as reviewing exam results at the beginning of the year. These may involve whole-staff meetings (PAT-FG, PAT-P) or occur during 'Croke Park' hours (TOM-FG, JOE-P). JOE-FG and JOE-P described occasions where data such as targets were discussed in great detail at management meetings while teachers in DAN-FG, JOE-FG and PAT-FG described informal conversations about teaching, learning and planning. The data discussed varied but included: student care and special needs (JOE-FG, TOM-FG, LEO-P), teaching strategies (JOE-FG, TOM-P), SSE planning (PAT-FG, TOM-P, DAN-P), survey findings (PAT-FG, TOM-P) and improving student attainment (DAN-P, TOM-P, JOE-P). A number of participants (ANN-DP, DAN-FG,

PAT-FG, TOM-P) described how individuals or groups were encouraged to take initiatives, including with the use of data. DAN-FG, ANN-DP, TOM-P described a school culture or practices of sharing information while DAN-FG, PAT-FG, ANN-DP highlighted how technology has made communication and sharing of data much easier. There were numerous opportunities for management and staff to collaborate in all schools and, occasionally, data featured in these meetings but, it appears, data was under-utilised as a means of providing focus in those discussions.

4.5.2. The role of technology

The role of technology at various levels of administration, from classroom to whole school has increased significantly in all schools over recent years, as has the openness towards its use (ANN-DP, LEO-FG). 'The rapid pace of technological advancements has resulted in unprecedented capacities to gather, analyse, and distribute data about students' (Cho and Wayman, 2015, p.1205) and all schools described some form of technology for attendance with TOM-FG and JOE-P describing this approach as routine, nowadays. Several schools (DAN-FG, PAT-FG, ANN-FG) mentioned the use of a school network for sharing materials including resources, schemes, plans, etc, however, a number (ANN-FG, LEO-P, JOE-P) described the need for the MIS technology to develop further. ANN-DP was happy with their use of technology but others (DAN-FG, LEO-P) were considering the development of Virtual Learning Environments (VLEs). E-mail was mentioned specifically as a significant feature of the organisational communication by PAT-FG and ANN-DP, although a teacher in PAT-FG said it was the younger staff who made most effective use of this. The benefits of access to school data outside of the premises, through technology, was mentioned by DAN-FG, PAT-FG and BOB-FG. TOM-FG and LEO-P described how parents had access to certain data through portals such as VSware. PDST Spreadsheets (TOM-FG, JOE-FG) and Office 365 (TOM-P) were mentioned as other examples of technology that contribute to how data was used in schools and its effectiveness. Participants in all schools, therefore, appreciate the role of technology in gathering and sharing data and many take it for granted.

4.5.3. Training and experience in using data

For the majority of participants, especially the teachers (LEO-FG, JOE-FG, PAT-FG, BOB-FG, TOM-FG, DAN-P), most of the learning how to use data came from 'on the job learning', figuring it out for themselves, either individually or collaboratively. ANN was the only school

where specific training on using data was mentioned (ANN-DP). This was done by the Deputy Principal himself who had previous experience involving data analysis. He emphasised that, although he gave instructions on how to analyse data, teachers interpreted the data for themselves and formed their own conclusions. PAT-P described facilitating training on using data but this was more an explanation of how SSE data was analysed by the coordinating teacher. Participants from four other schools (JOE-FG, PAT-FG, BOB-FG, LEO-P, JOE-P) described receiving in-house training in Standardised Testing but, with the exception of JOE, this amounted to an induction to the testing rather than dealing with the pedagogical implications. In JOE, a teacher who was a trained psychologist provided training to the staff on Standardised Testing and the implications to consider when planning (JOE-P). Other relevant in-house training provided in schools included course delivery applications such as Google Drive, Office 365 and Edmodo (ANN-FG, JOE-FG, BOB-FG, TOM-P). An induction to the MIS (ePortal or VSware) was also mentioned (ANN-FG, LEO-FG, TOM-P), again however, these sessions were brief and focused on technical aspects. Training for SSE was mentioned in three schools (JOE-FG, TOM-FG, PAT-FG, PAT-P) but this revolved around understanding the requirements of the SSE Guidelines (DES, 2011b) rather than how to use data, even as part of implementing the SSE process. Similarly, ongoing Professional Development in pedagogies was mentioned in ANN-FG and JOE-FG, however, these did not reference using data. Participants in JOE-FG, BOB-FG, TOM-FG, DAN-P said they gained much of their understanding of data from modules in their primary or post-graduate degrees. Participants from PAT-FG, TOM-FG, LEO-P, DAN-P stated that advice was available about Standardised Tests and their implications from the Special Needs Department should one seek it. It is obvious from the reports in this Case Study that practical and systematic training in gathering, analysing and using data was virtually non-existent and there was even an assumption (DAN-P) that this training was unnecessary. Much of the training provided skirted around data but no school had a coherent plan to develop staff capacity in using data. Three principals (TOM-P, LEO-P, DAN-P) and teachers in BOB-FG did not see the necessity for any further training in data, although some (LEO-FG, JOE-FG and PAT-P) would appreciate a facility to obtain advice when necessary. It was notable that there was not unanimity between the teachers and the principals in the schools above.

In terms of the training participants would like, ANN-DP, BOB-P, JOE-P stated they would like training in relation to technology use, Google Drive, VLE, Excel etc. Teachers in LEO-FG and JOE-FG felt they need more training to utilise the MIS better. Teachers in ANN-FG

and PAT-FG would like training in all aspects of data use from gathering, analysing, to subsequent planning and implementation. On the other hand, participants in LEO-FG, TOM-FG, BOB-P were comfortable gathering data but would like training on how to analyse data. JOE-FG and PAT-P would like on-going support and advice on implementation following the analysis. Similarly, LEO-FG, TOM-FG, BOB-P specifically mentioned implementing approaches based on information gleamed from Standardised tests. BOB-P would like to arrange training around pedagogy while PAT-P would like support on coordinating the use of data in relation to SSE, JCSA and planning for individual student needs in particular. BOB-P would like training in more sophisticated tools and approaches while teachers in JOE-FG would like a suite of training options. A teacher in TOM-FG also expressed a preference for a trainer with an external perspective, expertise and experience on planning and implementation with data from outside her school. This research concurs with Hamilton et al. (2009) who describe the need for a suite of training options on data use practices, data interpretation, and using computer programs associated with data analysis and storage.

4.5.4. Target Setting

Participants in every school referred to tracking performance and students setting target grades for examinations. On the other hand, instances of teachers or principals targeting grades for groups of students were not described in any school, with JOE-P suggesting that approach would be challenging to implement. TOM-P, however, together with her teachers, approximated rather than set targets for grades in Leaving Certificate, based on student performance in assessments up to that point. JOE-P emphasised that it was the students who set the targets; this was to ensure they had ownership of the targets and, therefore, were more responsible for them. The task of students setting targets was done by every year group, with their Year Head or Class Tutor, at the beginning of each assessment period in ANN, DAN and TOM (ANN-DP, DAN-P, DAN-FG and TOM-P). In JOE, this was done by the Year Head after consultation with the principal (JOE-P). Only Third and Sixth year students set targets in PAT and LEO while it was the principals who coordinated the approach in JOE, PAT, LEO and BOB (JOE-P, JOE-FG, PAT-P, LEO-P, BOB-FG and BOB-P). JOE-P argued, that some expertise in analysis was required before setting effective targets that will challenge both the student and the teacher. Students then discuss these targets with their teachers. According to JOE-P, as well as informing the teacher, it makes them accountable to the student to provide the appropriate teaching and learning to enable them to achieve their aims. He described a

scenario where teachers would respond to students own target grade: JOE-P: 'the intended outcome was that the student and teacher could have a professional dialogue: This is what I want to achieve; you think I'm only a D3, I want a B3, then tell me how to get there…' TOM-P and BOB-P had a page at the front of student journals where students wrote in their targets and their term results. Making parents aware of their child's target was another feature of this practice and JOE-P insisted that these were the focus of discussions in Parent-teacher meetings.

Targets could also be used for lesson planning and, speaking in broad terms, a teacher in LEO-FG said: 'Well I suppose I differentiate according to where they want to go, so if it's a sixth year… I know where they're going and how far to push them'. JOE-FG said target setting stimulates and focuses discussions, including informal chat in the staff room, and feeds into how teachers select appropriate strategies. JOE-P describes how some teachers set class targets as consequence of seeing the targets some students set themselves. Some teachers use class targets as a means to motivate students and provide formative feedback on how they are performing in relation to their peers.

4.5.5. Data involving parents and students

All schools sought out student and parental opinion and, for most, this extended beyond the scope of the SSE process. Most schools described a process of consultation with students and parents, either through online surveys (JOE-FG, ANN-FG, TOM-P) or Focus Group discussions (JOE-FG, PAT-FG, ANN-FG, ANN-DP, DAN-P, JOE-P). It was generally agreed that online surveys made it easy to consult a large number of parents and students, and teachers in BOB-FG, for example, noticed how students were increasingly interested in getting feedback on their contributions. In a number of the situations (BOB-P, TOM-P, PAT-P), students were consulted about their experience of the school, particularly towards the end of sixth year, often called 'an exit survey' and these included questions about teaching, policies and/or the learning environment. Formal interviews or the formation of Focus Groups for the purpose of gathering data was less common but the principal of TOM, stated that students were involved in several committees and their opinions were both used and valued. Similarly, ANN-DP said the views of parents were frequently sought as part of their planning processes while DAN-P and JOE-P said parent's main involvement was at Parent-Teacher meetings. No participant described eliciting parent's views through the Parents Association. As part of the process of keeping parents informed about what was happening in the school, JOE-P described explaining target setting to parents, stating 'I have given them the tools to have the conversation with the teacher,

for instance at the October parent/teacher meeting for sixth years'. He also described how parental involvement could be a 'catalyst for data use'. Data involving parents and students, therefore, was perceived in terms of gathering opinion in reaction to some prompt, however, in order for students to achieve to their the full potential, Cook-Sather (2006) suggests schools have to engage in authentic open dialogue with students or listening to the student voice. Meanwhile, parental involvement is consistently associated with pupils' success at school, according to Harris et al. (2008), it is one of the key factors in securing higher student achievement and sustained school performance. The recently published 'Action Plan for Education 2016-2019' (DES, 2016a) envisages that the voices of the service users receive more attention by developing a Parents and Learners Charter on a statutory basis.

4.5.6. Security of data

Security of data was not prominent in any of the discussions, even among the principals. Teachers seemed to regard it as a responsibility of management, while principals relied on the technology service provider. Teachers in LEO-FG, JOE-FG, TOM-FG, DAN-FG and ANN-FG did express some concern about security, either information being unfiltered or misused but BOB-P, PAT-FG, TOM-P had no such worries. DAN-P said:

> We try our best. We password protect and keep centrally as many of the databases as we can, with limited access and then we feed off that database, certain amounts of information to staff, as much as they need to know, basically.

Teachers in LEO-FG expressed concern about the detail of information available and questioned if teachers needed access to information on ethnicity, for example. The principal of PAT (PAT-P) expressed some concern, for example, with paper records left around, whereas the teachers PAT-FG showed no such concern and even said they were satisfied teachers there would always act professionally. Teachers in JOE-FG, PAT-FG and JOE-P stated that security and protocols about appropriate storage, distribution and use had been discussed with the staff and they were aware of what was expected of them. All schools described a movement towards cloud computing but only PAT-P, TOM-FG, JOE-P, TOM-P expressed any concern about the security of this. TOM-FG and JOE-P assumes their service providers takes precautions to ensure such data was stored safely. This relaxed attitude contrasts with Hamilton et al. (2009) who highlight the need for school authorities to carefully consider security needs for their data system as their data-based decision-making process evolves.

4.5.7. Factors supporting data use

Participants described several contributing factors that made the roll out of data possible in these schools but most of the components emanated directly from the school leaders or they played a significant role. Various forms of distributed leadership such as delegation to individuals or committees were mentioned by a number of schools (ANN-FG, PAT-FG, TOM-FG, TOM-P, PAT-P, DAN-P) as was a willingness by management to share data (ANN-FG, JOE-FG, BOB-FG, TOM-FG, JOE-P). Management promoting collaboration involving data (DAN-FG, TOM-FG, JOE-P) and individual or groups encouraged or required to use data (ANN-FG, PAT-P, DAN-P, JOE-P) was also mentioned. Teachers in JOE-FG, BOB-FG, JOE-FG appreciated how management made the process of using data easier, for example, by undertaking much of the mundane calculations, beforehand. Teachers in PAT-FG and TOM-FG described the value of allocating time for groups to work together with data. DAN-FG, TOM-P and PAT-P described staff openness to information or new ways to improve their teaching, similarly, PAT-FG, ANN-DP and PAT-P described teacher's openness to CPD and willingness to learn from each other. Technology in the form of a school network, cloud computing, Office 365, and VSware/ePortal was mentioned as significant contributing factors in most schools (ANN-FG, LEO-FG, PAT-FG, BOB-FG, TOM-FG, TOM-P). PAT-FG, BOB-FG, JOE-FG, TOM-FG and JOE-P described seeing the benefits of using data as a supportive factor to collaboration with data. A number of participants described the tradition or experience of using data developed over time, for example in DEIS schools, as a huge advantage (PAT-FG, BOB-FG, LEO-P, TOM-P, PAT-P, DAN-P).

4.5.8. Factors hindering data use

Lack of sufficient time (DAN-FG, LEO-FG, JOE-FG, ANN-DP, LEO-P, PAT-P, DAN-P), data overload, excessively complex processes (PAT-FG, BOB-FG, TOM-FG, ANN-DP, LEO-P, JOE-P) or else the process being regarded as low priority, irrelevant or a distraction from teaching (DAN-FG, JOE-FG, PAT-FG, BOB-FG, JOE-P) were cited as the main obstacles to effective use of data in schools. There was also frustration with the limitations of the technology available (DAN-FG, JOE-FG, PAT-FG, TOM-FG, ANN-FG, JOE-P, LEO-P) and deficiencies in training (DAN-FG, JOE-FG, BOB-FG, JOE-P). Teachers in ANN-FG and TOM-FG said that concerns about security were impeding the broader adoption of data based processes in their schools while LEO-FG, JOE-P and PAT-P felt some hesitation was due to teachers questioning the motivation or teachers feeling under pressure from greater scrutiny.

Wayman et al. (2012a) found teachers were mainly ambivalent towards data use but many of the barriers are structural, similar to this research and, therefore, possible to remove.

4.5.9. Outcomes of using data

Although teachers and leaders were fulsome in their descriptions of the positive outcomes of using data, this was based on their opinions and they had little or no evidence (for example, by way of surveys or other data) to back up their beliefs. For most of the participants in this research, this was the first time they were asked about their use of data, the exception was JOE-P who had demonstrated his use of data to new principals in his ETB and to a DES Inspector. The range of outcomes below indicate the range of influences data can have on the school as an organisation.

Participants in all schools cited the scrutiny of data, in some form, as improving school effectiveness (ANN-FG, BOB-FG, JOE-FG, PAT-FG, BOB-FG, ANN-DP, LEO-P, TOM-P, BOB-P, DAN-P). The second most commonly cited outcome of using data was that teachers had more comprehensive information on which to base decisions about students (ANN-FG, BOB-FG, LEO-FG, JOE-FG, BOB-FG, LEO-P, PAT-P, JOE-P). This was followed by lesson and programme content formed from data, for example, informing differentiation strategies or assessment practices (BOB-FG, LEO-FG, JOE-FG, TOM-FG, PAT-P, DAN-P). Participants in ANN-FG, JOE-FG, BOB-FG, LEO-P, JOE-P described how management, teachers and students had more informed discussions about selecting levels, subjects, programmes and exam targets. Similarly, support programmes, such as the systems for tracking student performance contributed to improved student outcomes (ANN-FG, BOB-FG, JOE-FG, BOB-FG, BOB-P, DAN-P). In some schools, policies were informed based on data gathered (ANN-DP, LEO-P) and priorities such as attainment, attendance, spelling or problem solving were identified through analysis of data (ANN-FG, BOB-FG, JOE-FG, PAT-FG, PAT-P). The experience of using data in this way has led teachers in some schools to proactively seek-out their own data (LEO-FG, PAT-FG, BOB-FG, LEO-P, PAT-P, BOB-P, JOE-P). LEO-FG, JOE-FG, BOB-FG, TOM-FG, LEO-P mentioned improved communication between students, teachers and parents as a consequence of using data. ANN-FG, JOE-FG, LEO-P, JOE-P describe more focused discussions about student, subject and teacher performances and disparities between them. Other consequences of using data identified by more than one school include: systems established to identify underperforming students or those exceeding expectations (ANN-FG, BOB-FG, BOB-P), more balanced mixed-ability classes (ANN-FG, JOE-FG, DAN-P),

identification of patterns in truancy (ANN-FG, PAT-FG, BOB-FG) and management being alerted to misbehaviour much quicker (ANN-FG, ANN-DP). There was greater emphasis on, or analysis of, student attainment (BOB-FG, LEO-FG, JOE-FG) and student's opinions were taken more seriously (TOM-FG, ANN-DP, PAT-P). ANN-FG, BOB-P, DAN-P describe how there was more data available to discuss problems teachers or Subject Departments may be experiencing. There was also better evidence (ANN-FG, BOB-FG) and more focused discussions (LEO-FG, JOE-FG) when dealing with parents. In a similar vein, ANN-FG, JOE-FG, DAN-P, suggest that, as their experience of data was continuously developing, a culture of gathering and analysing data for decision making was growing stronger.

Other significant outcomes identified were: data influenced the nature of CPD (JOE-FG, PAT-P) and was a 'vehicle' for professional conversations with colleagues (JOE-FG). Centralising data was making it more accessible (ANN-FG), students were talking about attainment targets at home (BOB-FG) and they were more reflective because they were consulted more (TOM-FG). Analysis of examination data has 'got more subject areas to step up to the mark, it's raised the bar, raised aspirations' (TOM-P) and has similarly 'raised expectations amongst staff' (JOE-P). Greater access and sharing of data requires teachers to be careful how they record information and follow procedures while BOB-P, PAT-P, LEO-P found analysis of data significantly affirmed the work of teachers and the school. The principal of LEO described the scenario where teachers were now arguing for resources based on data, discussions were now occurring around Success Criteria and what constitutes an A, B etc. and the focus of conversations had shifted because students now had the tools and terms (eg: targets) to discuss their own learning (LEO-P).

4.6. Summary

In accordance with international research (Mandinach and Gummer, 2016) school assessment and state examinations were the primary types of data considered in planning. Much of the data, including attendance and behaviour, appeared circumscribed and considered in isolation rather than examining the possible relationship between contributing factors. SEN and SSE data got only cursory consideration which may be indicative of the value placed on non-assessment data. Quantitative data was preferred because qualitative data was complex and more difficult to utilise.

Although there was different emphasis there was no substantial difference between the reports from the principals and Focus Groups. In general, it was the principals who made most use of computers for analysis whereas teachers took on a more utilitarian role. With the exception of TOM-P, the principals and teachers did not collaborate to make sense of data together, in fact, usually there was a clear distinction between the analytical processes both groups engaged in.

This research reemphasises the significance of principal's leadership in promoting data use found in research (Wayman et al., 2012c, Louis et al., 2010, Lachat and Smith, 2005). This was manifest as openness with data, distributed leadership opportunities and, in most cases, ICT skills in data analysis. Technically proficient leaders managed most of the analysis themselves while less proficient leaders relied on, and shared more responsibility among staff. While all principals used assessment data to monitor student and teacher performance, leaders did not use data to address underperformance among teachers. The emphasis in data use appeared to be on improvement, although Subject Departments were expected to account for examination results. Although student's performance was monitored over time, schools did not establish the difference they made (value added) to individual student results or that of groups of students.

Teachers are mainly concerned with attendance, punctuality, behaviour and assessment data, however, when asked, they focused on summative term and school tests rather than routine class assignments which could be used formatively. Similarly, their concept of data revolved around whole school requirements and, even then, their engagement with school data, such as SSE, was limited. Practices varied between schools, however, some principals (PAT-P, DAN-P and JOE-P) questioned if teachers fully engaged in reflection on data relating to their own students. Much of this research indicates both a lack of understanding of data by teachers and only cursory requirements to show evidence of engagement with data.

The staff in all schools met regularly; except for a review of examination results at the beginning of the year, data does not feature prominently on these occasions. Opportunities to collaborate together, data focused leadership, a supportive culture and effective technology were identified as factors supporting data use. There appears to be a symbiotic relationship between data use and technology and, as Jimerson and Wayman (2015) pointed out, 'training for data use often is synchronous with technology training' (p. 36). Training, however, did not focus specifically on developing capacity in data use and there was no apparent vision for developing data skills among staff in general. The availability of time and appropriate

technology appear as significant barriers to data use, as was the low priority accorded to using data for decision making. These findings are remarkably similar to the findings from Schildkamp et al. (2014) in their research across five European countries. They categorised influences on data use as organizational, data and data system, and user characteristics (ibid, p.22). Parental and student opinions were not prominent forms of data in these schools although they are increasing in significance (see DES, 2016a). The next chapter will examine these findings in more detail.

Chapter 5

Discussion and Conclusions

5.1. Introduction

This research focuses on the experience of seven schools which were identified as demonstrating excellent practice in the use of data. The literature indicated four main themes in order to address this issue: (1) What is the nature of data used, how data is used, (2) by principals and, (3) by teachers and (4) what are the organisational influences on use. Interviews were held with principals and Focus Groups of teachers. In order to verify statements made during the interviews and to gain a further insight into the processes involved in analysing data, the principals and teachers were asked to demonstrate how they use data. There are several similarities between the research literature and the Case Study findings such as the dominance of assessment data over other forms of data and the pivotal role played by school leadership, teacher collaboration and computer systems in the promotion of data use. As indicated in the research findings, there remains plenty of scope to integrate data use further into the organisational culture of the schools and especially, increase the formative use of student learning data in teachers practice.

5.2. The nature of data used

5.2.1. Assessment data

In the absence of any considered approach to data use in Irish schools, these schools developed their own techniques, in isolation, essentially based on the principal's ideas and rely on their knowledge, skills and experience. As indicated in research literature (see Schildkamp et al., 2012b, Mandinach and Gummer, 2016, Marsh et al., 2006), the first tentative endeavours in data use usually focus on the highest priority to the school, namely student performance in exams. Teachers and principals attitudes towards assessment were dominated by analysis of State Examinations with virtually no consideration given to the formative potential of routine class assessments and the relationship between class, school and state exams. Almost all discussions were focused on improving exam results, thus, placing value on the outcomes rather than looking at improving the process when evaluating results. This contrasts with Hattie and Yates (2013) who found that teachers who use such evidence formatively to inform their teaching are more effective. A reoccurring theme was evident at an early stage; classroom data such as topic tests, essays, projects are not valued as sources of worthwhile evidence. There is not a tradition of teachers planning and evaluating assessment collaboratively or any form of moderation so, consequently, the products of learning may lack the validity and reliability of a

robust exam setting. Two schools (JOE-D and BOB-D) used Continuous Assessment to track student progress but they did not realise the full benefits of this approach because the results were not used to provide formative feedback to students about their learning (see Hodgson and Pyle, 2010, Hattie and Timperley, 2007, OECD, 2005, Black and Wiliam, 1998). Although mentioned, Formative Assessment techniques were not embedded in the schools and only one teacher mentioned adjusting her teaching approach arising from an examination of students work (TOM-FG). Post-exam analysis did not appear to lead to substantial alterations to Subject Department plans which indicates a disconnection between the analysis, consequential planning, implementation and subsequent evaluation. This analysis, therefore, was regarded by some teachers more as a bureaucratic task rather than a genuine self-evaluation process.

5.2.2. Attendance data

Taking attendance is a routine part of every school day and was done on the computer in the sample schools. As such, it is the most prolific data available, but unlike assessment data, for example, it only came into focus when a problem was highlighted. Perhaps this is why it was not mentioned in every school. Attendance data is very easy to compile, less complex to understand, less threatening to analyse and easier to evaluate the effectiveness of related interventions. Improvements in attendance can have a tangible impact in schools and the influence of monitoring through the use of data, can improve attitudes towards data use more generally. One would, therefore, expect that this data would be more to the fore in schools use of data, even encapsulating the data practices in the school. This was not the case, however, and LEO-P was an exception when he demonstrated the correlation between poor attendance and exam performance. None of the schools, including the DEIS schools, were able to present detailed statistics dealing with truancy. This may be an indication of their fixation with assessment data over other forms, ineffective strategies promoting attendance or, perhaps, incomplete data. Darmody et al. (2008) describes the 'institutional habitus of the school' is one of the main factors that contribute to truancy and go on to suggest that data may provide options to addressing the issue (p.5). All absences, suspensions and expulsions are reported to TUSLA, however, up-to-data statistics on the profile of absenteeism nationally are not available (TUSLA, 2016). Such information provides an important reference for schools and the absence of easily accessible, up-to date and disaggregated data is an impediment to the effective use of attendance data. TUSLA (2016) have statistics on a number of years but they are in .pdf format. There are, however, proposals to improve DES data systems in the Action

Plan for Education 2016-2019 (DES, 2016a) which may redress these deficiencies through a portal which will provide a range of relevant national statistics.

5.2.3. Special Educational Needs data

All schools have details of students and their special educational needs available but this information seemed to be compartmentalised to the SEN Department and SEN Folder. Teachers in several schools were informed about the nature of students SEN at the beginning of the year and subsequently consulted SEN teachers if they needed advice or support. In general, teachers drew upon this information as the need arose rather than it forming an integral part of their planning which highlights the disconnection between the data and teachers practice. Shevlin et al. (2013) described inclusion policies and practices as yet to be firmly embedded in Irish schools with many teachers facing difficulties with the implementation or viewing SEN as the responsibility of others. Individual teachers and Subject Departments collaboratively reviewing the implications of Standardised Tests would represent a culture-shift for most of the schools, towards a more student-centred, flexible and strategic approach to planning (see Gleeson, 2012, Gilleece et al., 2009).

Standardised Tests were used to inform interventions, provide baseline student attainment data and in a number of cases evaluate student's progress in relation to their point of entry. The Cognitive Abilities Test (CAT4) was the Standardised Test used in all the Case Study Schools and it not only provides an objective analysis of every student's ability, but reports describe the implications for teaching and learning. Again, this feature was an underutilised resource even though it provides valuable information for lesson planning and Subject Department Schemes. There is criticism of standardised testing, however, including that they are biased against minority groups and children with special education needs; they can be characterised by selective administration and selective interpretation of results; motivational, emotional and personality factors are valued less than cognitive factors and they don't provide information on metacognitive processes (Haywood and Tzuriel, 2013). In addition, Morris (2011) describes the census based standardised testing used in Ireland and being rolled out at secondary level, as lending itself towards an accountability agenda as it allows the Department of Education to directly compare schools.

5.2.4. Attitudinal data

Over recent decades, there has been a trend towards participatory reform in education with student and parental input an important factor in these efforts (Auerbach, 2007). Practices of eliciting attitudinal information should be embedded in all schools from the implementation of the School Self-evaluation Guidelines (DES, 2011b) yet this source of data was not prominent in the schools studied. Parent's and pupil's opinion appears to be sought for narrowly defined purposes, often to do with SSE. Several schools, however, did engage purposefully with parents in a genuine attempt to gain parent's and student's insight on a number of topics (eg: ANN-DP and BOB-P). Obtaining student's opinion was in formal settings through surveys and Focus Groups but there was only one report (TOM-FG) of a teacher soliciting student's opinion on lessons or seeking their preference.

As well as being key stakeholders, who have a right to have their views heard, student and parental opinions can play a crucial role in school improvement by offering unique perspectives and suggestions. In seeking these opinions, schools have a responsibility to respond to them, not just from an organisational accountability perspective, but as an indication of the value schools place in such consultation. Involving parents and students in school decisions inevitably changes the dynamic with teachers; their authority to make judgements relating to behaviour and performance will be challenged, for example, in what is unacceptable behaviour and whether a student has the capacity to improve their work. Having the right to participate and contribute are part of an ongoing learning process in school that develops young people's sense of belonging and identity and teaches young people that they can effect change in their own lives and their environment (Harrison et al., 2016). Research by Leithwood et al. (2004) indicate that parents are capable of exerting considerable political influence on the content and processes of school improvement, especially more economically advantaged parents. Similarly, research by Hanafin and Lynch (2002) and Byrne and Smyth (2010) indicate that parents with lower levels of educational attainment or negative experience of schooling are less likely to become involved in school structures, so, in order to obtain an authentic and representative view of parent opinion, some schools will have to go beyond quick and easy online surveys.

Technology has made communication much easier, including eliciting student and parental opinions and sharing planning and assessment documents. Although more time consuming and laborious than online surveys, several schools sought the opinion of student or parents

through Focus Groups in an effort to ascertain the narrative behind the opinions. Focus group or individual interviews with disaffected or less engaged parents should be considered in order to get a rounded view of parents opinions and useful evidence to address their concerns. Engagement with student and parent opinion in the research schools involved purposefully seeking information in response to specific questions, no consideration was given to information which may exist or could be compiled, for example, relating to complaints or queries. Examining what data already exist needs to be the starting point in schools data processes going forward.

5.2.5. Gathering Data

Participants in all schools were able to outline a range of relevant data, however, the incoherent and diffuse nature of the data described highlights the limited knowledge of different types of data. Although participants had a substantial amount of data already available to them in their MIS to initiate an analysis process in terms of SSE, all ignored this and described gathering new data. Again this points to a flawed process; schools did not start with the data they had and use this as the first iteration of their research cycle (see Altrichter et al., 2013, McNiff, 2013). Similarly, the schools used a variety of data gathering approaches but consideration was not given to how the data schools already have, as a matter of course eg: exam reports and SEN data, could be compiled and used in systematic manner. There is a danger if schools were aware of all the data they already have available, they would be overwhelmed by it; on the other hand, teachers and management may come to realise the power of integrating various information at all levels of the school. Gleeson (2012) describes Irish teachers as sceptical about using research and reflective practice and criticises the inadequate support and structures for educational research. There may be a challenge, therefore, in promoting research based practices in schools and developing a proactive enquiry based culture. Menter (2015), however, describes the capacity to identify, evaluate and respond to educational research as becoming a feature of professional standards across the UK and Ireland (see Teaching Council, 2016) and together with practices required of School Self-evaluation, school based research may become more common than previously.

5.2.6. Analysing data

The process of analysing data was disjointed. Principals analysed examination data using computers while teachers were given exam statistics and asked to consider their implications,

collaboratively, in their Subject Departments. Usually teachers were asked to report on these deliberations but principals rarely reviewed them and they were just added to Subject Department folders. This inclination towards a purely bureaucratic exercise does little to promote the development of skills and values for data use. In other scenarios, sub-committees of staff were tasked with gathering and analysing data relating to an aspect of SSE or other school issue. There was no concerted effort, however, to develop the research or analytical skills of teachers, in fact, some principals regarded this as unnecessary (DAN-P, LEO-P). For data use to be taken seriously, it must be woven into the routine operation of the school rather than being seen as an 'add-on' to existing practices (Mandinach and Gummer, 2016).

It is clear from an examination of the teacher's documentation that they pay cursory attention to the analysis; data pointed to the problems but neither the data nor the discussions focused on the strategies to resolve the issues. This concurs with research by Ikemoto and Marsh (2007) who found teachers struggled to analyse their data, partly because they were not clear about what they were trying to address and partly because the data pointed to problems but did not help with responses. Developing teacher's skills and experience in analysis would empower them to extract meaning from data more broadly, enhance their organisational perspectives and help develop a problem-solving approach to their work. Hargreaves (1996) suggests that 'if systematic inquiry becomes a more integral part of the professional culture of teaching, it will encourage and empower teachers to identify and resolve more of their own school-level problems' (p.118). Almost all of the analysis engaged in by the teachers in this study involved superficial descriptions of the information apparent from the data, (for example; describing information in bar charts) and did not extend beyond one or two variables (years and levels). A number of participants had difficulty with the equivocal nature of qualitative data (LEO-P, BOB-P, DAN-P, JOE-P) which may be down to epistemological incongruence with their previous 'scientific' training. Much of this could be overcome, however, with training and experience because they acknowledge such data provides better insights into the behaviours and actions of subjects (see Cohen et al., 2013). Subject Departments worked in isolation and had neither the structures, support, nor an expectation from management to go beyond this perfunctory analysis. This contrasts with Deike (2009) who found principals who worked collaboratively and acted as instructional leaders established clear norms for data use and were more likely to embed data initiatives in their schools.

This research has highlighted a technology skills deficit among some principals; the technology competent principals could scrutinise data involving multiple variables and in several formats in order to extrapolate meaning from large datasets. On the other hand, the two less technically competent principals were either reliant on teachers without management experience and perspective or reliant on their own ability to interpret and deduce information. The technology supported analytical capacity seemed to be a source of power for at least one principal who did not wish to relinquish it (JOE-P), while, the lack of skill among other principals, led to more collaborative and distributed analysis which, by default, contributed towards expanding the skills and experience of more staff. As also identified by Hamilton et al. (2009) due to their currency and import at the beginning of the year, examination data provided an effective catalyst for discussion and analysis in all schools.

Paradoxically, the analytical features of the MIS were both underutilised and insufficient to meet the principal's needs. Neither ePortal nor VSware includes all the features required to gather, analyse and present the data required, for example; conduct surveys, aggregate and disaggregate multiple variables and present the findings in an uncomplicated graphical format. The analysis relied, predominately on the skills of the principal, sometimes in consultation with the staff including specialist personnel, such as SEN teachers or Guidance Counsellors. As Cho and Wayman (2015) point out there is a mismatch between the technical possibilities of data systems and the organisational requirements; they use the description 'technological determinism' (p.1207) which oversimplifies and underestimates the importance of human agency and sense-making between technology and practice. The size of the market may constrain the development of tailored systems in Ireland but, as Van der Kleij et al. (2014) indicate, technologists and users need to work together to develop a system to meet the needs of schools.

5.3. Principal's use of data

5.3.1. Leadership style

In accordance with the literature, this research indicates that the principals are the crucial element in the utilisation of data in these schools (see Wayman et al., 2012c, Louis et al., 2010, Lachat and Smith, 2005, Mandinach et al., 2006, Park and Datnow, 2009). All the principals in this study could be characterised as analytical by nature but this is manifest in two approaches to using data. The first group are highly computer literate and examine the data

(primarily examination data) and then identify the school priorities for improvement. They essentially use data to derive and drive decision making. On the other hand, the other group rely more on their experience and intuition as well as data to identify priorities, then use data to confirm or disprove their opinion and, subsequently, they use their intuition, informed by data, to guide their actions. Intuition in these cases is not haphazard or devoid of apparent reason, rather it is the logical reasoning, described by Johnson and Kruse (2012), that derives from accumulated leadership knowledge and skills, formed from experience, which enables leaders to make decisions subconsciously, quickly and instinctually.

DAN-P, LEO-P, BOB-P and JOE-P stand out from the others in the decisive role technology plays in their leadership and their decision making. In the absence of training or a suitable computer programme they have devised their own techniques to analyse data. This knowledge and experience, however, is concentrated in them alone. They have not seen the necessity to train others in their approaches nor do they see these skills as valuable to teachers with LEO-P stating teachers have "enough to be doing". JOE-P who is beginning to give his middle management more responsibility analysing data, was concerned however, that he would lose control of the analysis process. Senge et al. (2012) counselled against the guru leader, recommending instead that the principal coach their staff to exercise more responsibility and initiative so all staff recognise their leadership roles in the organisation. In several schools, although leading the implementation process may be distributed, control of the information follows a hierarchical structure which suggests an underlying concern for power as well as a recognition for the potency of data. Having access to a wide range of data gives an incredible insight into the running of the school, its strengths and vulnerabilities. Wayman et al. (2006) observed that principals who worked closely alongside teachers found greater acceptance guiding them in using data to inform their practice. Sharing decision making not only promotes a shared vision, it improves morale and enhances the quality of decisions and contributes towards a culture of collaborative enquiry (Copland, 2003, Leithwood et al., 2004, Spillane et al., 2004).

There is a danger, in the current scenarios, that by limiting teacher's involvement to implementation, data analysis is seen as a management function which is separate to what teachers do or is an excessively complex process that requires specialist skills and experience. This reinforces a division between teaching and leadership where teachers, not only miss an opportunity to consider the variables influencing school decisions but also the broad factors

that influence student performance. It also emphasises the managerialist perspective of data rather than promoting the potential of data for improvement planning. Teachers are also deprived of an opportunity to see the impact their work has on their colleagues and the whole organisation. Training and involving teachers from the beginning, empowers them to consider their own implications from data, devise solutions, and engage in multifaceted analytical thinking beyond merely implementing the curricular decisions. The findings from the study schools contrast with the study by Wayman et al. (2012c) who found four strategies in particular were effective for principals in promoting data use: focusing data use on the larger context, facilitating collaboration around data, distributing leadership, and fostering common understandings.

It may be the case that principals are still at the early stage of coming to terms with using data and, as their confidence increases, teachers experience develops and student performance improves, they will take on more coaching roles and relax some of the constraints. Sitting with teachers in a coaching role will involve a different dynamic for many principals, involving their beliefs and opinions being challenged and having to be open to learn about data from others perspective (see Marsh and Farrell, 2014, Datnow and Hubbard, 2016, Marsh, 2012).

5.3.2. Tracking

The principals were very conscious of the sensitive nature of exam results and were at pains to emphasise that their objective in examining them was school improvement rather having any accountability agenda. The discussions, therefore, always focused on student performance and actions rather than teacher performance. Extremely sensitive to maintaining an acquiescent climate, principal's priority, at this stage in promoting data use, is to get buy-in from the teachers and embed the practice in the school. As Jacob and Lefgren (2008) indicate, principals are fairly adept at identifying teachers whose students make the most and least progress, it is shrewd that these principals do not use examination data as evidence to challenge teachers' performance. As exam results often represent more than just student ability, it is difficult to disentangle a teacher's contributions to student's learning (Burnett et al., 2012) and using results in such a way risks alienating teachers (Valli et al., 2007). According to Staman et al. (2012), however, analysing examination data leads to a more 'professional school culture' as well as improving collaboration, communion, capacity and teacher's attitudes towards providing the type of instruction necessary for students (p.5). The principal's approaches in this study are rather task orientated, deductive and narrowly focused on using defined datasets

rather than promoting a broader culture of inquiry. Katz and Dack (2014) describe how a culture of inquiry develops educator's skills and confidence in using data beyond the immediate tasks by inculcating a way of thinking that challenges the status quo and promotes collaboration and continuous professional development.

The innovative systems for tracking student results from school entry to Leaving Certificate, devised by the four principals, are more accurate than the method of comparing school results with national averages in various subjects (see www.pdst.ie/postprimary). Smyth (1999) described school examination results as a reflection of the nature of the students choosing to attend that school and, in accordance with this principle, these schools are wise to review their student's results with reference to their entry assessment. Exams assess content knowledge and are not psychometrically based or norm-referenced, therefore, are not directly comparable to standardised scores. The principals recognise this fact and use standardised test results to gauge improvement/deterioration in student performance rather than quantifying the amount of change. There were two approaches to doing this; an absolute approach based on the raw scores from one exam to the next and the relative change in position in relation to one's peers. The loading of contextual variables that impact student outcomes to determine 'Value Added' by the school is controversial (see Braun, 2010), however, these principals do not attempt to imitate this approach. Although intrigued by the concept of Contextual Valued Added, JOE-P was sceptical that a valid system is possible. The absence of an effective system to predict student performance is a hindrance to those principals trying to ascertain the contribution the schools are making to their students education and this should be a priority for government. JOE-P, BOB-P, DAN-P and LEO-P, in particular, recognise that there is considerable potential in such a system and yearn for a more professional, sophisticated and integrated model involving national data than the current model offered by the PDST.

5.4. Teacher's use of data

5.4.1. Types of data used by teachers

Schools introduction to data has focused mainly on the state exams and teachers immediate perceptions of DIDM was in reference to whole-school data and whole-school decision-making when, in fact, they hardly considered the routine data they use in their classes. The data they did describe (attendance, punctuality, assessment and behaviour data) was viewed from a whole school perspective rather than for their own formative purposes. It is likely that the

teacher's conception of data did not extend to class or student information because, unlike the aforementioned data, there was neither an assumption nor expectation that they discuss evidence of teaching and learning. Similar to findings from Curry et al. (2016), discussions about data use did not consider classroom level factors such as classroom assessments. Kirkup (2006) suggests formative assessment practices have been devalued by the dominance of external, high-stakes summative examinations which emphasises performativity and measurement. 'The effective use of data requires that teachers develop the knowledge and skills to analyse and use data to improve instruction' (Datnow and Hubbard, 2016, p.7) and, although some participants mentioned Formative Assessment, they did not appear to value the products of student learning as worthwhile data and did not know how to use such evidence formatively. Although, using student learning data is one way to ground DIDM in practical and immediate instructional decisions, research indicates that often teachers lack the confidence and/or capacity to successfully engage with and use potentially formative data (Dunlap and Piro, 2016). Similar research by Gelderblom et al. (2016) show that teachers either do not make adequate use of the information available, fail to analyse the data effectively or concentrate their data use on the underperforming students.

Heitink et al. (2016) found teachers need to be able to interpret assessment information on the spot, engage students in reflection on their learning and provide specific and constructive feedback. Both academic research and the findings from this study, therefore, point to the need to develop teachers' capacity to recognise and formatively use the evidence of learning teachers come across every day. Furthermore, Datnow and Hubbard (2016) described how 'teachers' capacity to use data and their beliefs about data use are shaped within their professional communities, through training, and through interactions with management. This research therefore points towards an approach to both CPD and work practices that promotes a collaborative and inquiry based culture that focuses on developing teachers Assessment Literacy (Stiggins, 2001).

5.4.2. Comparisons with state exams

There was a variety of practices in how state exam data were analysed, ie: there was a distinction between analysis of results *per se* and analysing the implications of data distilled and presented in a predefined format. Some teachers received the results already compared and did not have to go through the laborious task of downloading and entering results, neither did they experience the range of data available nor have the opportunity to consider their other

potential uses. The significant analysis, for them, was considering the 'cause and effect' of the data as by having to enter the data oneself, one learns about cleaning and filtering data, the importance of verifying information and, consequently, gaining greater insight into initiating analysis of one's own data. Without fully understanding the process, having a sense of ownership and genuine engagement, there is a danger that the process becomes little more than a bureaucratic exercise that may be viewed more as an accountability mechanism rather than a tool to reflect on ones practices. On the other hand, Marsh (2012) argues that interventions are more likely to succeed when data are easy to understand and use. Some principals were sceptical whether teachers genuinely reflected on exam results and whether it made any difference to their planning or teaching, however, Schildkamp et al. (2015) suggests that, although, discussions may not necessarily lead to action, they may challenge preconceptions and there is powerful learning in finding out one is wrong.

Examination data also provides an indication of how a subject department or teacher is performing and can help identify areas to develop, providing a basis to align the department's vision of the way ahead and providing a means to gauge improvement. Such analysis can increase teachers understanding of the curriculum and what is required for exams. If these perspectives and skills are not developed, collaboratively, dealing with Subject Department data then it will be more difficult to integrate them into classroom practice when teachers are on their own. Working together helps teachers problem solve as well as facilitate the exchange of resources and expertise required to implement reforms that improve student learning (Copland, 2003, Mandinach and Honey, 2008). A benefit highlighted by LEO-P, for example, was that teachers were marking term exams more accurately and consistently from analysing school and state exam results. On the other hand, Marsh et al. (2015) indicates that teachers often respond to data in superficial ways or by making procedural changes to practice that do not significantly change their instruction. This is similar to the findings in this research where teachers wrote largely descriptive and bland explanations for results students received that lacked depth and authentic reflection on teaching practice. Such superficial analysis was accepted as sufficient by principals in all schools which is, not only a poor reflection on what is expected of teachers, but questions the authenticity of the exercise.

Smyth (1999) found the variation between performances within schools was greater than between schools. There is merit, therefore, in considering how discussions based on exam and other Subject Department data could lead to greater subject and programme coherence,

consistency of expectation and continuity between teachers. Data can identify common areas of concern, utilise the strengths and talents of colleagues, foster a supportive atmosphere and promote collegiality. The reticent conception of data use in the sphere of teaching, on one hand, and the restrained, predefined, task orientated exam analysis on the other, has a limiting effect on the potential for data use in Subject Departments. This, however, may be the case at the early stages of integrating data into the operation of the school. Within this *milieu*, the potential for teachers to mentor and coach students is understated. Where teachers have a sound understanding of analysis, they are better able to respond to particular needs suggested by data and targeting improvement efforts on issues such as closing achievement gaps and motivating students (James et al., 2006). Using data to inform planning and directing coaching conversations can develop a shared understanding of the outcomes to be achieved and actions that need to be taken by students and the teachers (Hamilton et al., 2009).

5.4.3. Assessment data

The concept of 'Common Assessment' was also misinterpreted in the study schools to mean little more than common marking schemes, thus, missing the value of teachers reviewing marks together, sharing challenges and successes and improving their practices, collaboratively. Collectively reviewing students work provides valuable professional development and enhances professional judgements as well as contributing to a sense of collegiality and professionalism (see Sharratt and Planche, 2016, Mottier Lopez and Morales Villabona, 2016). Similar to LEO-P, Mills et al., (2012, cited in Renshaw et al., 2013) reported improved consistency of assessment across classrooms as a result of moderation practices through greater coherence in terminology, criteria, and approaches. On the other hand, Smith (2004) found the moderation process had a constraining effect, discouraging creativity and standardising exercises. Moderation did not occur in any school in this study and JOE-P did acknowledge the problem of subjectivity when each teacher marks their own students without reference to department colleagues which, in turn, has the potential to undermine comparisons. More specifically, moderation is an opportunity to improve the validity, reliability and consistency of marking as well as providing a forum for teachers to discuss their practice, learn from colleagues and gain useful insight for their own teaching. The role of moderation is one of the most controversial aspects of the Junior Cycle Student reform and is an area that has been muted down considerably from original proposals (Quinn, 2015).

Changes in the JCSA will see a de-emphasis in the formal exam, increased focus on evidence of learning and its formative use so the classroom dimension of data use will increase in significance (see DES, 2015). Clearly from this research, to be successful this process requires investment in resources, teacher collaboration, time and CPD as well as carefully considered quality assurance mechanisms. In describing a project aimed at enhancing teacher competence in summative assessment, Black et al. (2011) assert that using school assessments for national examinations can only be justified if they are based on procedures and criteria that are comparable within and between schools which, in turn, require a robust moderation process. A repercussion of decreasing the significance of the terminal exam, however, is that schools may lose faith in an assessment that schools use as a datum to compare student progression.

5.4.4. Special Education Needs data

The sparse use of Special Education Needs data highlights the preparedness of teachers to use the information available in planning their annual schemes and adjusting their lessons accordingly. Only a few teachers, however, stated they refined their lesson plans including altering the attainment objectives to reflect the needs and abilities of those in their classes. Other teachers tentatively considered or ignored the information, preferring to base their decisions on their intuition and experience. In the absence of a requirement to make special provision for SEN students in lesson planning, it is unlikely that many teachers will devise separate and specific plans for the students with special needs in their classes (O'Mara-Eves et al., 2012). Stroggilos and Xanthacou (2006) found developing such plans to be resource intensive and the lack of appropriate resources poses a barrier. Also specialist training on planning the curriculum to suit different types of SEN may also be required (Smith and Thomas, 2006). Research indicates, however, that developing education plans can be particularly useful in post-primary schools in aligning lessons to national standards (NCCA, 2007, O'Mara-Eves et al., 2012).

Being aware of student abilities enables teachers identify struggling or high performing students in order to adapt their instruction. SEN data informs the teacher about an individual students' strengths and needs in order to provide appropriate interventions and enables a teacher to challenge a student according to their ability. Not using the data in these scenarios may provide an indication of whether or not the teachers are differentiating their instruction or effectively catering for students' individual needs. Shevlin et al. (2013) stated that inadequate support to help teachers make provision for SEN students can 'perpetuate negative attitudes

towards students with special educational needs and encourage scepticism about the viability of inclusive education models' (p. 1122).

5.4.5. Student attitudinal data

Arguably, there are three perspectives in developing opportunities to hear students' opinions; firstly, the development of skills and experience to become participative members of society, secondly, developing student's ability to reflect on their own learning, establish their own goals and motivation for life-long learning. Thirdly, there is the assertion of young people's rights to be listened to, valued and have their opinions considered by those who exercise authority over them (see Harrison et al., 2016, Smyth, 2006, Donnini, 2015, Horgan et al., 2015). All these have relevance in school. Seeking out and considering student's opinions seems to be an approach at whole-school level rather than the classroom, although one teacher (TOM-FG) did report asking students what activities they like and having them evaluate lessons. This suggests a confident teacher who is prepared to take time to listen to the 'student voice' and has a flexible, open-minded and creative approach to their lessons. Identifying with particular teachers with whom they had a good rapport was found to be an important enabler of 'student voice' (Horgan et al., 2015). The student voice in teaching is growing in significance and is a valuable source of information on how the students feel they are progressing and the appropriateness of the pace of instruction.

> Participation in decision-making increases self-confidence and motivation in children as they see that teachers value their input; it facilitates them to contribute to how and what they learn and thus can improve their learning experience; it promotes their personal growth and development; and it promotes a wider recognition of increasing independence. (Horgan et al., 2015, p.19)

Students may not be competent to evaluate the course design, instructional approach or assessment methods but they have a unique perspective on the quality of the instruction and can provide valuable feedback to the teacher.

5.4.6. Teacher's attitude towards using data

Several participants described how getting teachers to use data routinely in teaching requires a cultural shift and this was beginning to happen (ANN-FG, LEO-FG, LEO-P, JOE-FG, JOE-P, BOB-P). Three principals (PAT-P, DAN-P and JOE-P) describe those teachers who are unwilling or are suspicious of integrating evidence into their decision making as unreflective, preferring to work in isolation and are not student centred. These are the same people and same

characteristics that are problematic in any circumstance in modern schooling and obstinacy to data is emblematic of this attitude. 'Teacher belief systems are frequently unaddressed in educational reform efforts', however, improvement in the instructional component is essential in order to realise the benefits DIDM (Datnow and Hubbard, 2016, p.24). Ryan's (2014) research into data use practices among Irish primary teachers found a "significant predictive relationship between data confidence, data values and data use" with greater data confidence leading to greater data use. Datnow and Hubbard (2016) also point out that data use must be decoupled from accountability requirements and involve student learning material because, as Curry et al. (2016) foud: when data is used to inform, rather than evaluate instruction, teachers begin to practice reflective teaching.

5.5. Organisational influences on data use

5.5.1. Opportunities to collaborate

Participants in all schools valued the opportunity to collaborate in Subject Departments and data, in the form of examination reviews and planning documentation, appeared prominently in those discussions at the beginning of the year. The deliberations, however, appear to focus extensively on explaining the results achieved rather than reflecting on teachers actions, sharing alternative approaches and discussing student learning. Although exam data provides a focus, Subject Department meetings also present an opportunity to focus on formative activities such as examining examples of students work, comparing success criteria and discussing the impact of feedback. This formative data is much more subject specific so the support of subject colleagues is critical in exploring and generating new ideas, reviewing resources, discussing instructional approaches and sharing content knowledge. Changing the nature of the dialogue among teachers, from focusing on examination and organisational data, towards collaboratively reviewing evidence of student learning involves wider organisation and attitudinal change than using data alone. This would require these teachers to reflect on their professionalism, be prepared to refine their relationships and interactions with colleagues, foster a sense of collegiality where they seek and actively engage in opportunities to learn with and from each other. Contextual factors, such as organisational characteristics, communication and leadership, will influence how colleagues work together and, as Marsh et al. (2015) point out, interpersonal relationships in collaboration is particularly significant when sharing class-level data. Creating an environment of trust and support is essential in order to face the difficult conversations about performance and work practices; however, starting discussions with

apparently innocuous classroom data and initially focusing on improvement rather than accountability may provide a route to develop that culture.

At school level the 2012 School Self-evaluation Guidelines provide a coherent structure for schools to engage in data in a strategic way and it was surprising that SSE did not feature more prominently in discussions. The SSE process, however, has had only very limited success in raising awareness about the potential of data use and precipitating a self-evaluation culture. MacBeath (2005) described school self-evaluation as 'a process of reflection on practice, made systematic and transparent, with the aim of improving pupil, professional and organisational learning' (p.4). So SSE is an opportunity to engender an ethos of organisational learning in which teachers work together to develop their practice to improve student outcomes but it cannot be based on a series of intermittent, ancillary activities but part of a whole school strategy to foster a culture of enquiry based on evidence. SSE can stimulate questions about policies and practices and, as part of that process, data can be interrogated to query unexpected outcomes, highlight alternative perspectives and provoke debate (Chapman and Sammons, 2013).

5.5.2. The role of technology

The use of School Management Information Systems has rapidly increased due to their efficiency and effectiveness and are now an integral part of schools (see Shah, 2014, Selwyn et al., 2015). Technology has revolutionised the gathering, access, storage, sharing, manipulation and communication of large and varied data which teachers can use to make more appropriate planning and instructional decisions. Similar to this research, Murray (2013) found that although educators have access to more data than ever before, most teachers and some principals lack the skills to use the data for student and school improvement. Meanwhile, the speed, efficiency and capability of Information Systems is forcing teachers to confront new skills and reconsider the way they work. As well as contributing to content and how teachers work, technology is facilitating greater scrutiny of teachers work and this reciprocity will continue as schools increasingly take learning online through Virtual Learning Environments and Learning Management Systems (Killion, 2015).

Weathers (2013) suggests the further development of Information Systems will support classroom instruction, incorporate third-party functionality, mobile apps and real-time information. Recent developments have seen the potential of MIS being enhanced further with

the integration of Learning or Knowledge Management Systems (Pynoo et al., 2011) and there is more scope here with the application of Learning Analytics. Knowledge of Learning Analytics (LA) will provide teachers with an insight into how students are learning, their strengths and weaknesses, through complex assessment and usage algorithms and will be key skills in the future. Although none of the schools in this research describe using a VLE (DAN-FG and LEO-P are in the process of developing one), most VLEs provide analytical features and, as VLE become more common at secondary level, more learning data will become available. LA has considerable potential in the collection, measurement, analysis and reporting on data about learners and their context with the view to understanding and optimising learning and the environments in which it occurs (Dawson et al., 2014, Siemens, 2013).

Technology has also improved the means of communication between teachers, parents and students, enhancing the communication between home and school. As an easy, efficient, and effective method of transferring information, many parents have come to expect that schools provide them with timely information about their child's academic progress, regularly and promptly (McKenna and Millen, 2013).

5.5.3. Target Setting

It is the students in these schools who formulate their own targets and, consequently, they are more student centred and based on the student's own expectations and beliefs about their ability. Stiggins (1994) said the quality of any assessment regime depends on the clarity and appropriateness of the achievement target to be assessed and a student defined target is even more powerful. In a number of cases the principal leads the student through a process of self-evaluation, identifying their examination goals and the actions they need to take in order to get there. Despite the clarity and precision of targets, the principals did not succumb to quantitative indicators of student achievement alone but sought to add depth and meaning through interviews and discussions. They humanised the data by going beyond the numbers and put value on the voice of the student which, in turn, the teachers could resonate with. By having students set the targets, teachers are challenged to meet those expectations and, in a circuitous manner, become accountable to the students for the quality of their teaching.

This approach makes teachers indirectly accountable to students to put in place the types of planning and instruction required to help them achieve their desired goals. JOE-P argues that some expertise in analysis is required before setting effective targets that will challenge both

the student and the teacher, however, valuable insights are excluded by not involving class teachers. A number of authors (see Datnow and Hubbard, 2016, Erkens, 2009, DeLuca et al., 2016) describe the often complex skills involved in asking the right questions of data and being able to analyse the responses to promote student learning. Similarly, in their book, Klenowski and Wyatt-Smith (2013) describe some of the challenges that may face the effective implantation of the revised Junior Cycle, ie: combining curriculum standards, teacher judgement and moderation practices in order to provide coherence between system and local requirements. Having teachers more involved develops teachers own analytical and planning skills, gives teachers greater sense of ownership and gives them a sense of professionalism, driving the process rather than acting as technicians reacting to it. The student target systems described in this study, may have the effect of motivating interested and ambitious students but does not, necessarily, challenge less engaged but capable students. This is another reason to have class teachers involved as they can embed a culture of setting goals and self-evaluating on one's progress, among all their students. Dweck (2012) describes how classroom practices and activities can be used effectively to shape students' orientation towards goals and develop confidence and a 'growth mindset'. Principal's involvement in discussions with students about examination objectives does, however, have the added benefit of alerting them to the structures and activities needed to help students fulfil their ambition and was, thus, a means of promoting standards and leading learning in their schools.

5.5.4. Factors supporting data use

The determination of the principals was the overwhelming influence in the use of data in the Case Study schools. This was manifest directly through providing technology, a willingness to share data, encouraging staff to experiment with data, establishing expectations and structures for data use, devoting time to working collaboratively with data, filtering and simplifying data use and, exemplifying the use of data in their decision making. This study has reiterated the critical role of leadership and actions of the principal in promoting data use in schools found in the literature (see Wayman et al., 2012c, Park and Datnow, 2009, Lachat and Smith, 2005, Halverson et al., 2007, Earl and Fullan, 2003). Teacher's willingness to engage with data practices, collaboration and professional development were also important factors, as were their professional attitudes which recognised the value of this for their students (see Means et al., 2009, Datnow and Hubbard, 2016, Hattie and Yates, 2013). Developed in the absence of thought or support from the Government or academia, in difficult economic

circumstances and in the face of challenging industrial relations, what has emerged is principal centred, examination focused and task orientated rather than culturally transformational. Despite possibly being regarded as bureaucratic and distracting from their primary role of teaching, due to careful management of the process, teachers in these schools have acquiesced to the principal's proposals. The use of data is accepted as one more change in the school improvement process. Teachers have not necessarily considered the bigger implications in terms of the potential greater scrutiny of their work, but, because they have not had in-depth discussions, they are ambivalent even careless about the potential long-term ramifications which conforms to research by Wayman et al. (2012a). These teachers acknowledge that data use has improved the organisational effectiveness and contributed positively to their own knowledge, planning and pedagogy. This could be enhanced further with training and the development of data informed formative assessment practices and the development of a culture that promotes collaborative enquiry and Action Research. Authors, such as Marsh (2012), Poortman et al. (2016) and Deppeler and Ainscow (2016), suggest that such practices, not only positively influence teachers disposition towards data, but helps them 'engage in a continuous improvement process that allowed them to take more ownership over local data and expand their role in their schools' decision-making processes' (Huffman and Kalnin, 2003, p.569).

5.5.5. Factors hindering data use

The challenges to data use found in this study are largely similar to those found in research literature (see Schildkamp et al., 2014, Wayman et al., 2012a, Datnow and Hubbard, 2016, Marsh, 2012, Ingram et al., 2004) and include: time consumption, complexity, perceived irrelevance, pressure from increased scrutiny, frustration with technology and concerns about security. Time away from teaching and learning is always a valuable commodity when implementing change in schools, but the provision of adequate training can address some of these factors, as can appropriate structures, funding and leadership. International evidence indicates that the role of data in school decision making is only going to increase as technology improves, accountability demands increase and governments continue their efforts to improve education outcomes (Means et al., 2009, Sahlberg, 2011, Mandinach and Gummer, 2016). There is, however, an opportunity to change the narrative from predominately outcome and summative in orientation to using evidence in a developmental way to improve students and teachers experience in the classroom.

5.5.6. Security of data

Not only did security of data not arise as a significant concern during discussions, most participants were largely unaware, even ambivalent, about the vulnerabilities associated with the information technology systems. Almost all schools (JOE being the exception) use a cloud-based Management Information System as well as an intranet system to enable teachers and students to store data, interact and collaborate. These activities would be severely affected if the system did not function correctly or data was infiltrated, and the consequences could lead to embarrassment, anger and jeopardise confidence in the further development of data use. In 2012, a serious security flaw in the data management systems used by a large number of Irish secondary schools resulted in highly sensitive data being accessed, thus; leaving the security of data completely in the hands of the technology providers, may be negligent (Irish Independent 22/10/2012). Schools must act on their responsibility to protect the privacy and security of student and teacher information through establishing policies and procedures that limit the access and use of personal information to legitimate educational purposes.

Relating specifically to Higher Education, but applicable in this context, Prinsloo and Slade (2016) describe the fiduciary duty institutions have in the collection, analysis and use of student data, especially as the balance of power is with the institution. Consequently, schools have a responsibility to ensure transparency, security, privacy and care in how they gather and use data. Prinsloo and Slade (2015) suggest colleges develop policies that describe what data is collected, the purpose, with whom it will be shared and, as far as possible, have students verify interpretations drawn from data or at least the rationale for using the data. Innovations such as cloud computing, MIS and Learning Analytics are increasing management, teacher, student and parental use of technology based information to inform decision making, but, not everyone understands the implications. A discussion must, therefore, take place among the stakeholders that addresses the benefits, dangers and uses of the data, ensuring a transparent, accountable and safe system in which everyone, legitimately, can have confidence.

5.5.7. Training in using data

The form of DIDM that has materialised in these schools is highly influenced by the principals: their skills, experience and the activities engaged in are formed from a principal's perspective. These principals, therefore, are in a unique position to share their expertise in data use with their staff, however, this has not happened in practice. CPD did not feature prominently in

discussions and none of the training, including relating to Assessment for Learning, focused on data. The 'on the job learning' could be described as haphazard with an assumption, on the part of principals, that teachers have sufficient skills and understanding to make sense of the data, their implications and can, subsequently, make changes in their teaching. Xu and Brown (2016), however, state 'many teachers are often involved in assessment-related decision-making without sufficient background or training in assessment' (p.149). Similarly, Datnow, & Hubbard (2016) state that, 'while the teachers may develop the skills to access and make sense of data, they may lack knowledge of how to adjust their instruction' (p.23). This research indicates that teachers are focusing on the task on hand, explaining exam results or reviewing targets, and do not consider the wider implications for practice. The educators appear not to fully grasp the implications of Formative Assessment and there is a need to shift from viewing assessment as an evaluation of learning to becoming an instrument of learning. Stiggins (2001) argued that teachers need to make instructional decisions based on assessment because assessment illiteracy will lead to false results and misdirection, thus, preventing student from reaching their full potential.

For data to be used consistently and well, principals need to foster a culture of enquiry where teachers know how to gather and analyse data, can work together to consider the implications of findings, share experience and plan solutions together. This should involve formal training and ongoing support. Despite their familiarity with the process and being evidentially capable of inducting staff (as witnessed by the researcher), principals appear reluctant to engage in coaching or mentoring activities which may reduce the uncertainty and develop staff skills. The literature, on the other hand, emphasises the power of principals modelling the use of data (Park and Datnow, 2009, Knapp et al., 2006, Nelson et al., 2015, Schildkamp et al., 2014). In addition, there may well be teachers on the staff with a range of knowledge and skills in research, pedagogy or Special Education Needs who, are comfortable with data, and willing to work with colleagues in a coaching capacity.

Several participants raised the availability of ongoing support and advice in research methods, pedagogy and leadership with data as areas of needing amelioration. The increased complexity and demand for data in many jurisdictions has introduced the practice of Data Coaching. A Data Coach provides specific guidance on interpreting and using data (Marsh and Farrell, 2014). In such scenarios, an external coach, in-house data person or team of teachers, guide teachers towards a culture where data is used strategically throughout the school, they model

data use and develop staff skills to identify and solve problems for themselves. Unlike content experts, such as literacy coaches, data coaches use a broader range of data, focus less on content and aim more to guide teachers in accessing, interpreting and using data with a view to develop their data literacy expertise (Marsh et al., 2015). Huguet et al. (2015) and Datnow and Hubbard (2016) identified key coaching practices including modelling how to interpret and act upon data, observing teachers engaging with data, providing feedback and sharing expertise, and acting as broker, connecting teachers to expertise and resources. Marsh's (2012) review of literature found data coaches make data safe and usable, provide both challenge and support, however, she also found coaches had a greater impact on teachers knowledge, skills and practice than on school or student outcomes. In some cases teacher leader's act as instructional coaches but their focus is often on developing teacher's skills to deliver the curriculum. It is important, in such cases, that the coaches involved have both excellent curriculum knowledge and facilitation skills (Blanc et al., 2010). The principals in these schools, therefore, have some of the knowledge, skills and experience to train their staff in analytics but they may not have competence in more classroom based Assessment Literacy. Distributing responsibility to suitable staff members to support and coach colleagues may offer a way forward and this may require further training to develop the broad range of expertise envisaged in Data Coaching.

5.5.8. Outcomes of using data

The descriptions of the outcomes of using data were overwhelmingly positive. These include improved organisational effectiveness, more informed deliberations, more comprehensive planning, improved communication and a developing culture of research. It is apparent that teachers and principals see the dividends from data and recognise a value in further developing their use of data. Their responses also indicate that, although data was used in collaboration, opportunities to work together with data occur at regimented times and stages of the year and, consequently, data use is not embedded in school cultures and practices. The main information attained from using data was to identify those students underperforming and those exceeding expectations, many of which may have gone undetected otherwise. Knowing this allowed teachers to differentiate their instruction to an appropriate level for students, enabling students and teachers to set intermediate attainment objectives, and identifying the students that need more support or more challenge. In their research on assessment, Hoover and Abrams (2013) found teachers did not tend to disaggregate results by content standards or student subgroups, and most teachers reported using results to evaluate their own practice rather than focusing

students' learning. They found teachers engaged in cursory analysis of student performance fairly regularly and conducted in-depth analysis less often (ibid). Datnow and Hubbard (2016) found that, although teachers value student achievement data in guiding their instructional decisions, many teachers view the requirement to formally examine this data as a "bureaucratic task to be completed" (p. 9). Such preconceptions constrain data use and it is vital that teachers not only see the merit to guide practice but are supported and facilitated in developing data skills and practices.

The main recommendations from participants in this study is to keep the implementation process simple and slow, have clear objectives and always keep the end-user in mind. Implementing these practices will, therefore, take time and require, not only support and resources, but a climate that is conducive to the whole staff working closely together with evidence.

5.5.9. Summary

A number of findings from this research immolate those found in international literature including the significant role played by the principal in promoting data use in these schools, the gravity placed on high-stakes examination data, the supportive role of MISs and, to a lesser extent in this study; the tendency for teachers to analyse data collaboratively. In comparison to jurisdictions where data use is much more integral to school's operation, there is no coherent vision, policy, structures or supports at national or local level to facilitate data use in the schools. Subsequently, these principals developed the practices of their own accord in these schools. Within the Case Study schools, there is a limited appreciation of the potential of different types of data for improvement planning, however, as these schools are at an early stage in the process of integrating data, this may develop further with time. Arising from the principal-centred nature of the data, the use of student learning data for lesson DIDM was not prominent. Several participants in this research mentioned Formative Assessment yet the potential of classroom evidence to student and teacher development was not considered. Opportunities for staff to collaborate with data did exist through 'Croke Park' hours and training sessions, however, these were underutilised in terms of data use and this was connected to the limited vision for data use in the schools and the absence of an enquiry culture.

Certainly, there are strong foundations to build upon in these seven schools. The principals need to develop the experience and skills of their staff in using data; from gathering and

analysis evidence to lesson and school improvement planning. Research indicates the power of leaders modelling their use of data (Park and Datnow, 2009, Knapp et al., 2006) and, during this study, these principals demonstrated their capacity to do this. Utilising the skills and experience of staff through distributed leadership also offers a way forward. The structured time available through Croke Park hours could be used by educators to scrutinise the products of student learning and, thus, promote reflection, share ideas and develop teacher's assessment literacy. Love et al. (2008) describe using five components of collaborative inquiry to promote data use: building the foundation; identifying a student learning problem; verifying causes; generating solutions; and implementing, monitoring, and achieving results (p.26). Such cycles of questioning, goal setting, evaluation and feedback focused on learning processes and student outcomes should not be transient events but become a way of working. This would involve constantly gathering, sharing, collectively analysing and using findings through a process of Collaborative Enquiry and Action Research. As described by Nelson et al. (2015), for sustainable improvements in the educational experience of students, capacity must be built within schools and evaluative processes become institutionalised ways of working. Schools will then become learning organisations involving ongoing collaborative discussion and decision making.

5.6. Recommendations

Arising from this study, a series of recommendations are presented below that will improve the use of data in School Improvement Planning. They are categorised as recommendations that may be implemented immediately and are relatively straightforward; recommendations for change in national policy and recommendations for change at school level.

5.6.1. Short-term recommendations.

1) Soft copies of examination results be shared with schools. Presently, information from the State Examinations Commission are sent to schools in hard copy which requires manual transcription into the schools MIS. Not only is this laborious and time consuming but it subject to input error.

2) The P-POD system be modified to include data required by other agencies such as TUSLA. P-POD was designed to gather data for the Department of Education, however, with slight modification it may provide coherent structure for compiling a range of educational data

and save schools time and resources looking for similar information at different times of the year for different agencies.

3) DES establish a set of specifications for MIS providers. This will provide basic standards and ensure such systems will address the needs of schools into the future. The Department of Education is in a unique position to establish basic operational requirements that would provide the foundation for the data to be used by schools. Once schools are aware of what is possible with the technologies, they will be in a better position to compare the packages and plan develop their data use practices. This will also help principals, who are less familiar with using data to come to terms with the increasing demands for system information.

4) The Inspectorate and school support services assist schools in their use of data. As the research literature and this study indicates, principal's leadership in data, teacher's Assessment Literacy, MISs and a collaborative inquiry culture are all key aspects in the promotion of data. Each of these are key consideration and, therefore, they should feature in discussions and supports provided by The Inspectorate as part of school inspections. The Inspectorate need to liaise with the support services to ensure the provision and nature of support for data use is appropriate to meet both school and system requirements.

5.6.2. National policy recommendations

5) The Department of Education develop guidelines and structures to support the use of data. This would involve providing guidelines to schools on how they could and should use data in decision making. Supports are required for teachers and school leaders, and should include the provision of a Data Coach to schools to help them develop their data practices. Such a position would involve coordination with the Inspectorate and may form part of the support mechanisms for SSE. In parallel with this, and in light of the increasing significance of data, every school should have a Post of Responsibility that incorporates data coaching. This should not only include School Improvement Planning but also support the pedagogical use of data and develop the Data Literacy and Formative Assessment skills of teachers.

6) The use of data and school research practices to be reviewed as part of External Inspection and School Self-evaluation processes in order to build a robust and sustainable models of school improvement.

7) The formation of an online national database be prioritised. This would include a range of national data that is relevant to both the Department of Education and to schools. Such a database would be internet based and contain information relating to schools improvement planning processes such as statistics on examination performance, attendance and behaviour. In order to avoid the formation of league tables, this portal would be password protected and the information could be disaggregated by a range of variables such as the gender profile of school, school size, location (both urban/rural and county), trustee body and DEIS. Having several variables would make it difficult to make sweeping comparisons about schools and, simultaneously, provide more specific information on comparable schools. This system would incorporate data from TUSLA, the SEC, and the Department of Education P-Pod system as well as support agencies such as NCSE, NBSS, PDST and perhaps the trustee bodies (in order to avoid duplication with their processes). The formation of such a database should involve consultation with a range of stakeholders, including the principals experienced in data use represented in this research. This will help ensure a coherent system that integrates with school MISs in order to avoid duplication, improve efficiency and ensure the smooth and transparent transmission of information.

8) Leadership development courses incorporate training in data use and practitioner research. Undergraduate and post-graduate teaching courses need to provide training in evidence informed decision making in teaching and learning.

5.6.3. School level recommendations

9) Schools foster a culture of Collaborative Enquiry. Research activities should focus both on whole school self-evaluation and the use of evidence to support student and teacher learning through Assessment for Learning. In fostering such an environment, the emphasis must be on data use for improvement rather than accountability.

10) Staff development incorporate practitioner research skills. This process of enquiry should be practically focused towards improving student's outcomes in classes and across the school. This would involve reflective problem solving, collectively by staff and be based on the continuous developmental cycles of Action Research (see Altrichter et al., 2013, McNiff, 2013).

11) Leadership be distributed. In order to build capacity and promote greater use of data, principals need to distribute responsibility throughout the organisation, drawing on the

specialist knowledge, skills and experience of a variety of staff. Some staff will require training and ongoing support in Data Analysis, Assessment Literacy and Research Methods and principals must be seen to lead by example in how they use evidence in their decision making.

12) The results of Standardised Tests be shared with staff and their implications for teaching and learning explained. This information, and SEN data, need to be incorporated into teaching plans, subject schemes and arrangements for CPD. Training, policies and procedures need to be established to address the increase in data use; both learning data and evaluation data.

5.6.4. Further Research

In the light of research undertaken in this study a number of themes for further research have emerged:

- Does tracking and target setting influence student performance outcomes? The systems for monitoring assessment results and setting examination targets were prominent in this research, however, there is no evidence of the difference, if any, these are making to attainment outcomes.

- What types of evidence may be used in Formative Assessment in an Irish context (essays, portfolios, objects etc.) and how might these data be used effectively? Not only did teachers in this research not consider the products of student learning as relevant data, they did not appear to know how to use such evidence in decision making. There is some research in an international context (see McMillan, 2012), however, there is scope for further research into what evidence teachers could use in different subjects and how to use that data effectively for Formative Assessment.

- What factors influence the effective moderation of student assessment? Increasingly, subject teachers are being asked to collaboratively grade or moderate assessments in order to improve the reliability of marking and benchmark grades against pre-set criteria. There is limited research available on how experience, social interactions and reflection influence the marking process (Watty et al., 2014). Research into collaborative grading practices could have practical benefits for teachers and schools.

- What factors influence subject teacher's use of SEN data? Although the details of Students Special Education Needs were available to teachers in this study, they did not use this data in their planning. Based on this research, there is further scope to examine the supporting and hindering factors that influence the use of SEN data by subject teachers.

- What factors should schools consider to ensure the security and privacy of data? With the increasing use of data for administration and learning, an investigation is required to identify the regulations, policies and practices necessary to protect the privacy and security of teacher and student records while also improving student attainment.

- Can Learning Analytics improve attainment outcomes in secondary schools? Learning Analytics is an emerging area in Higher Education but its potential to inform teaching and learning in secondary schools is not understood. Further research in the use of LA tools to generate useful information, for teachers and students, in order to improve the learning process is recommended.

References

Altrichter, H., Feldman, A., Posch, P. & Somekh, B. 2013. *Teachers investigate their work: An introduction to action research across the professions*. New York: Routledge.

Altrichter, H. & Posch, P. 2014. Innovation in education through action research. *IN:* Stern, T. T. a. R. F. & Schuster, A. (eds.) *Action research, innovation and change: International perspectives across disciplines.* New York: Routledge.

Anderson, S., Leithwood, K. & Strauss, T. 2010. Leading data use in schools: Organizational conditions and practices at the school and district levels. *Leadership and Policy in Schools*, 9, 292-327.

Argyris, C. & Schon, D. A. 1974. *Theory in practice: Increasing professional effectiveness*. San Francisco: Jossey-Bass.

Arsenault, A. & Anderson, G. 1998. Qualitative research. *IN:* G. Anderson & N. Arsenault, *Fundamentals of Educational Research (2nd ed.)* London: Routledge Falmer.

Auerbach, S. 2007. Visioning parent engagement in urban schools. *Journal of School Leadership & Management*, 17, 699-734.

Bailey, K. 1994. *Methods of social research.* New York: Free Press.

Basit, T. 2003. Manual or electronic? The role of coding in qualitative data analysis. *Educational Research*, 45, 143-154.

Bassey, M. 2000. *Case study research in educational settings*. Buckingham, Open University Press.

Bernard, H. R. 2012. *Social research methods: Qualitative and quantitative approaches.* New York: SAGE.

Bernhardt, V. 2013. *Data analysis for continuous school improvement*. New York: Routledge.

Black, P., Harrison, C., Hodgen, J., Marshall, B. & Serret, N. 2011. Can teachers' summative assessments produce dependable results and also enhance classroom learning? *Assessment in Education: Principles, Policy & Practice,* 18, 451-469.

Black, P. & Wiliam, D. 1998. *Inside the black box: Raising standards through classroom assessment*. London: Kings College.

Blanc, S., Christman, J. B., Liu, R., Mitchell, C., Travers, E. & Bulkley, K. E. 2010. Learning to learn from data: Benchmarks and instructional communities. *Peabody Journal of Education,* 85, 205-225.

Boudett, K. P., City, E. & Murnane, R. 2005. *Data wise: A step-by-step guide to using assessment results to improve teaching and learning*. Cambridge, MA: Harvard Education Publishing Group.

Bourdon, S. 2002. The integration of qualitative data analysis software in research strategies: Resistances and possibilities. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* [Online], 3. Available from: http://nbn-resolving.de/urn:nbn:de:0114-fqs0202118 [Accessed 06 June 2016].

Bowen, G. A. 2009. Document analysis as a qualitative research method. *Qualitative Research Journal*, 9, 27-40.

Braun, H. 2010. *Issues in measuring student growth and conducting productivity analyses.* Washington, DC: Educational Testing Service.

Brickmore, D. 2014. Charter principal autonomy: A missed connection between data-driven decision-making and instructional leadership. *IN:* A. J. Bowers, A. R. S. & Barnett, B. G. (eds.) Bowers, Shoho & Barnett (eds.), *Using data in schools to inform leadership and decision making*. 1-16. Charlotte, NC: Information Age Publishing.

Briggs, A. R., Coleman, M. & Morrison, M. 2007. *Research methods in educational leadership and management*. New York: SAGE.

Bringer, J. D., Johnston, L. H. & Brackenridge, C. H. 2006. Using computer-assisted qualitative data analysis software to develop a grounded theory project. *Field methods,* 18, 245-266.

Broadfoot, P. M., Daugherty, R., Gardner, J., Harlen, W., James, M. & Stobart, G. 2002. *Assessment for learning: 10 principles*. Cambridge, UK: University of Cambridge School of Education.

Brown, M., McNamara, G. & O'Hara, J. 2016. Quality and the rise of value-added in education: The case of Ireland. *Policy Futures in Education*, 14, 810-829.

Bryman, A. & Bell, E. 2015. *Business research methods*. Oxford: Oxford University Press.

Burnett, A., Cushing, E. & Bivona, L. 2012. *Uses of multiple measures for performance-based compensation.* Nashville, TN: Center for Educator Compensation Reform.

Burns, T. & Wilkoszewski, H. 2013. *Governing complex education systems*. Paris: OECD.

Bush, G. W. 2001. No child left behind Act. Washington, DC: United States Department of Education. Available from: http://www2.ed.gov/admins/lead/account/nclbreference/index.html [Accessed 02 August 2016].

Byrne, D. & Smyth, E. 2010. *Behind the scenes?: A study of parental involvement in post-primary education.* Dublin: Liffey Press.

Campbell, C. & Levin, B. 2009. Using data to support educational improvement. *Educational Assessment, Evaluation and Accountability*, 21, 47-65.

Cartwright, N. 2011. *Evidence, external validity and explanatory relevance.* Oxford: Oxford University Press.

Celio, M. B. & Harvey, J. 2005. *Buried treasure: Developing a management guide from mountains of school data.* Seattle, WA: Center on Reinventing Public Education.

Chapman, C. & Sammons, P. 2013. School Self-Evaluation for School Improvement: What Works and Why?, Reading: CfBT Education Trust.

Chapman, J. D. 2005. Recruitment, retention, and development of school principals, Paris: International Institute for Educational Planning.

Cho, V., Jimerson, J. B. & Wayman, J. C. 2015. Data System Implementation A Leader Navigates People Problems Around Technology and Data Use. *Journal of Cases in Educational Leadership,* 18, 134-143.

Cho, V. & Wayman, J. C. 2015. Assumptions, strategies, and organization: Central office implementation of computer data systems. *Journal of School Leadership*, 25, 1203-1234.

Church, R. M. 2002. The effective use of secondary data. Learning and motivation, 33, 32-45.

Coburn, C. E. & Talbert, J. E. 2006. Conceptions of evidence use in school districts: Mapping the terrain. *American Journal of Education*, 112, 469-495.

Coburn, C. E. & Turner, E. O. 2011. Research on data use: A framework and analysis. Measurement: Interdisciplinary Research & Perspective, 9, 173-206.

Coburn, C. E. & Turner, E. O. 2012. The practice of data use: An introduction. *American Journal of Education*, 118, 99-111.

Cohen, L., Manion, L. & Morrison, K. 2013. *Research methods in education*. New York: Routledge.

Cohen, L. M. & Manion, L. 2007. L. & Morrison, K.(2000) Research Methods in Education. London: Routledge Falmer

Cook-Sather, A. 2006. Sound, presence, and power: "Student voice" in educational research and reform. *Curriculum Inquiry*, 36, 359-390.

Copland, M. A. 2003. Leadership of inquiry: Building and sustaining capacity for school improvement. *Educational Evaluation and Policy Analysis*, 25, 375-395.

Corner, T. 2015. *Education in the European Union: Pre-2003 Member States*. London: Bloomsbury Publishing.

Cousins, J. B. & Leithwood, K. A. 1993. Enhancing knowledge utilization as a strategy for school improvement. *Science Communication*, 14, 305-333.

Cregan, Á. 2008. *Sociolinguistic perspectives on the context of schooling in Ireland: Parent perceptions*. Dublin: Combat Poverty Agency

Creighton, T. B. 2006. *Schools and data: The educator's guide for using data to improve decision making.* Thousand Oaks, CA: Corwin Press.

Creswell, J. W. 2012a. *Educational research: Planning, conducting, and evaluating quantitative,* Harlow: Pearson Education.

Creswell, J. W. 2012b. *Qualitative inquiry and research design: Choosing among five approaches.* New York:SAGE.

Curry, K. A., Mwavita, M., Holter, A. & Harris, E. 2016. Getting assessment right at the classroom level: using formative assessment for decision making. *Educational Assessment, Evaluation and Accountability,* 28, 89-104.

Darling-Hammond, L. 2007. Race, inequality and educational accountability: The irony of 'No Child Left Behind'. *Race Ethnicity and Education*, 10, 245-260.

Darmody, M., Smyth, E. & Mccoy, S. 2008. Acting up or opting out? Truancy in Irish secondary schools. *Educational Review,* 60, 359-373.

Datnow, A. & Hubbard, L. 2016. Teacher capacity for and beliefs about data-driven decision making: A literature review of international research. *Journal of Educational Change,* 17, 7-28.

Datnow, A. & Park, V. 2009. School system strategies for supporting data use. *IN:* Kowalski, T. & Lasley, T.J. (eds.) *Handbook of data-based decision making in education*. New York: Routledge.

Datnow, A., Park, V. & Kennedy-Lewis, B. 2013. Affordances and constraints in the context of teacher collaboration for the purpose of data use. *Journal of Educational Administration*, 51, 341-362.

Datnow, A., Park, V. & Wohlstetter, P. 2007. *Achieving with data: How high-performing school systems use data to improve instruction for elementary students.* Los Angeles: University of Southern California.

Dawson, S., Gašević, D., Siemens, G. & Joksimovic, S. 2014 Current state and future trends: A citation network analysis of the learning analytics field. *IN: International Conference on Learning Analytics and Knowledg*e, Indianapolis, 231-240.

De Róiste, A., Kelly, C., Molcho, M., Gavin, A. & Nic Gabhainn, S. 2012. Is school participation good for children? Associations with health and wellbeing. *Health Education*, 122, 88-104.

Deike, M. A. 2009. *The principal as an instructional leader within the context of effective data use.* PhD thesis, University of Texas at Austin.

DeluCA:C., Lapointe-Mcewan, D. & Luhanga, U. 2016. Approaches to Classroom Assessment Inventory: A New Instrument to Support Teacher Assessment Literacy. Educational Assessment, In press. Available from http://dx.doi.org/10.1080/10627197.2016.1236677 [Accessed 16 August 2016]

Denscombe, M. 2010. *The good research guide: for small-scale social research projects,* Maidenhead: Open University Press.

Deppeler, J. & Ainscow, M. 2016. Using inquiry-based approaches for equitable school improvement. *School Effectiveness and School Improvement,* 27, 1-6.

DES 2003. *Looking at our school: an aid to self-evaluation in second-level school*s. . Dublin: Stationery Office.

DES 2005. *DEIS (Delivering equality of opportunity in schools): An action plan for educational inclusion.* Dublin: DES

DES 2006. *A guide to whole-school evaluation in post-primary schools.* Dublin: DES.

DES 2011a. *Literacy and Numeracy for Learning and Life: The National Strategy to Improve Literacy and Numeracy Among Children and Young People, 2011-2020*. Dublin: Government Publications.

DES 2011b. *School Self-Evaluation, Guidelines for Post-Primary Schools.* Dublin: DES.

DES 2012. *Circular 0040/2012: Implementation of School Self-evaluation*. Dublin: DES.

DES 2014. *Circular 70/2014: Guidance for post-primary schools on the provision of resource teaching and learning support.* Dublin: Government Publications.

DES 2015. *Framework for Junior Cycle 2015.* Dublin: DES.

DES 2016a. *Action Plan for Education 2016-2019.* Dublin: DES.

DES 2016b. *Circular 34/2016: Information in relation to Standardised Testing and Other Matters.* Dublin: Government Publications.

DES 2016c. *Circular 40/2016: Continuing Implementation of School Self-evaluation 2016-2020.* Dublin: Government Publications.

DES. 2016d. *Esinet (P-Pod Portal)* [Online]. Dublin: DES. Available: https://www.esinet.ie/portal/login.init.action [Accessed 03 July 2016].

DES 2016e. *Looking at our schools 2016. A Quality Framework for Post-Primary Schools.* Dublin: Goverment Publications.

Diamond, J. & Spillane, J. 2004. High-stakes accountability in urban elementary schools: challenging or reproducing inequality? *The Teachers College Record,* 106, 1145-1176.

Donnini, D. 2015. The role of student voice and choice in learner-centered competency reform. Thesis, (D.Ed). University of New England

Dunlap, K. & Piro, J. S. 2016. Diving into data: Developing the capacity for data literacy in teacher education. Cogent Education, 3, In press. Available from http://dx.doi.org/10.1080/2331186X.2015.1132526 [Accessed 21 August 2016]

Dunn, R., Jaafar, S. B., Earl, L. & Katz, S. 2013. *Towards Data-Informed Decisions: From Ministry Policy to School Practice. Data-based Decision Making in Education*. Dordrecht: Springer.

Dweck, C. 2012. *Mindset: How you can fulfil your potential*, London: Robinson.

Earl, L. & Fullan, M. 2003. Using data in leadership for learning. *Cambridge Journal of Education,* 33, 383-394.

Earl, L. & Katz, S. 2006. *Leading in a data rich world: Harnessing data for school improvement.* Thousand Oaks, CA: Corwin.

Ehren, M. C. M. & Swanborn, M. S. L. 2012. Strategic data use of schools in accountability systems. *School Effectiveness and School Improvement,* 23, 257-280.

Eivers, E., Close, S., Shiel, G., Millar, D., Clerkin, A., Gilleece, L. & Kiniry, J. 2010. *The 2009 national assessments of mathematics and English reading,* Dublin: Stationery Office

Erickson, F. 2012. *Qualitative research methods for science education. Second International Handbook of Science Education*. Dordrecht: Springer

Erkens, C. 2009. Developing our assessment literacy. *IN* Gusky, T.R., *The Teacher as Assessment Leader*, Bloomington, IN: Solution Tree.

Erskine, J. L. 2014. It changes how teachers teach: how testing is corrupting our classrooms and student learning. *Multicultural Education*, 21, 38.

Eynon, R. 2013. The rise of Big Data: what does it mean for education, technology, and media research? *Learning, Media and Technology,* 38, 237-240.

Fabry, D. L. & Higgs, J. R. 1997. Barriers to the effective use of technology in education: Current status. *Journal of Educational Computing Research,* 17, 385-395.

Farrell, C. C., Marsh, J. A. & Bertrand, M. 2015. Are We Motivating Students with Data? *Educational Leadership,* 73, 16.

Firestone, W. A. & Riehl, C. 2005. *A new agenda for research in educational leadership*, New York: Teachers College Press.

Fullan, M. 2000. The three stories of education reform. *Phi Delta Kappan,* 81, 581-596.

Gelderblom, G., Schildkamp, K., Pieters, J. & Ehren, M. 2016. Data-based decision making for instructional improvement in primary education. *International Journal of Educational Research,* 80, 1-14.

Gentles, S. J., Charles, C., Ploeg, J. & Mckibbon, K. A. 2015. Sampling in qualitative research: Insights from an overview of the methods literature. *The Qualitative Report,* 20, 1772-1789.

Georgiou, S. N. & Tourva, A. 2007. Parental attributions and parental involvement. *Social Psychology of Education*, 10, 473-482.

Gill, B., Borden, B. C. & Hallgren, K. 2014. *A conceptual framework for data-driven decision making*. Final Report of Research conducted by MathematiCA:Policy Research, Princeton, submitted to Bill & Melinda Gates Foundation, Seattle, WA.

Gilleece, L. 2012. Teachers' Pedagogical Beliefs: Findings from the First OECD Teaching and Learning International Survey. *IN:* König, J., *Teachers' Pedagogical Beliefs: Definition and Operationalization, Connections to Knowledge and Performance, Development and Change*, 109-130. Munich: Waxmann

Gilleece, L. 2014. Understanding achievement differences between schools in Ireland–can existing data-sets help? *Irish Educational Studies,* 33, 75-98.

Gilleece, L., Shiel, G., Perkins, R. & Proctor, M. 2009. Teaching and learning international Survey (2008): National report for Ireland, Dublin: Educational Research Centre

Gleeson, J. 2012. The professional knowledge base and practice of Irish post-primary teachers: what is the research evidence telling us? *Irish Educational Studies,* 31, 1-17.

Gold, T., Lent, J., Cole, R., Kemple, J., Nathanson, L. & Brand, J. 2012. Usage Patterns and Perceptions of the Achievement Reporting and Innovation System (ARIS). New York: The Research Alliance for New York City Schools.

Greller, W. & Drachsler, H. 2012. Translating learning into numbers: A generic framework for learning analytics. *Journal of Educational Technology & Society*, 15, 42-57.

Guba, E. G. & Lincoln, Y. S. 1981. *Effective evaluation*, San Francisco, CA: Jossey-Bass Publishers

Guba, E. G. & Lincoln, Y. S. 1994. Competing paradigms in qualitative research. *Handbook of Qualitative Research,* 2, 163-194.

Halcomb, E. & Hickman, L. 2015. Mixed methods research. *Nursing Standard*, 29, 41-47.

Hallinger, P. 2010. A review of three decades of doctoral studies using the Principal Instructional Management Rating Scale: A lens on methodological progress in educational leadership. *Educational Administration Quarterly,* 47, 271-306.

Hallinger, P. & Heck, R. H. 1996. Reassessing the principal's role in school effectiveness: A review of empirical research, 1980-1995. *Educational Administration Quarterly,* 32, 5-44.

Halverson, R. 2010. School formative feedback systems. *Peabody Journal of Education,* 85, 130-146.

Halverson, R., Grigg, J., Prichett, R. & Thomas, C. 2007. The new instructional leadership: Creating data-driven instructional systems in school. Annual Meeting of the National Council of Professors of Educational Administration. Washington, DC: Technomic Publishing.

Hamilton, L., Halverson, R., Jackson, S. S., Mandinach, E., Supovitz, J. A., Wayman, J. C., Pickens, C., Martin, E. S. & Steele, J. L. 2009. *Using student achievement data to support instructional decision making.* Philadelphia, PA: GSE Publications

Hammersley, M. 1997. Qualitative data archiving: some reflections on its prospects and problems. *Sociology,* 31, 131-142.

Hanafin, J. & Lynch, A. 2002. Peripheral voices: Parental involvement, social class, and educational disadvantage. *British Journal of Sociology of Education,* 23, 35-49.

Hargreaves, A. 1996. Transforming knowledge: Blurring the boundaries between research, policy, and practice. . *Educational Evaluation and Policy Analysis,* 18, 161-178.

Hargreaves, A. & Fink, D. 2012. *Sustainable leadership,* Chichester: John Wiley & Sons.

Hargreaves, D. 1997. In defence of research for evidence-based teaching: a rejoinder to Martyn Hammersley. *British Educational Research Journal,* 23, 405-419.

Harris, A., Andrew-Power, K. & Goodall, J. 2008. *Do parents know they matter? raising achievement through parental engagement.* London: Continuum.

Harris, N. 2009. Playing Catch-up in the Schoolyard? Children and Young People's 'Voice'and Education Rights in the UK. *International Journal of Law, Policy and the Family,* 23, 331-366.

Harrison, K., Taysum, A., McNamara, G. & O'Hara, J. 2016. The degree to which students and teachers are involved in second-level school processes and participation in decision-making: an Irish Case Study. *Irish Educational Studies*, 1-19.

Hatch, M. J. & Cunliffe, A. L. 1997. *Organization theory: Modern, symbolic, and postmodern perspectives,* Oxford: Oxford University Press.

Hattie, J. 2009. *Visible learning: A synthesis of meta-analyses in education,* London: Routledge.

Hattie, J. & Timperley, H. 2007. The power of feedback. *Review of Educational Research,* 77, 81-112.

Hattie, J. & Yates, G. C. 2013. *Visible learning and the science of how we learn.* . New York: Routledge.

Haywood, H. C. & Tzuriel, D. 2013. *Interactive assessment,* New York: Springer.

He, Q. & Tymms, P. 2014. The principal axis approach to value-added calculation. *Educational Research and Evaluation,* 20, 25-43.

Heitink, M. C., Van Der Kleij, F. M., Veldkamp, B. P., Schildkamp, K. & Kippers, W. B. 2016. A systematic review of prerequisites for implementing assessment for learning in classroom practice. *Educational Research Review,* 17, 50-62.

Heritage, M. & Yeagley, R. 2005. Data use and school improvement: Challenges and prospects. *Yearbook of the National Society for the Study of Education,* 104, 320-339.

Hess, F. M. 2008. The new stupid. *Educational Leadership,* 66, 12-17.

Hislop, H. 2012. The Quality Assurance of Irish Schools and the Role of Evaluation: Current and Future Trends. The Professor Seamas Ó Súilleabháin Memorial Lecture. Maynooth: NUI Maynooth.

Hislop, H. 2013. Applying an evaluation and assessment framework: an Irish perspective. Irish Presidency of the Council of the European Union, Presidency Conference: Better Assessment and Evaluation to Improve Teaching and Learning, Dublin: DES.

Hodgson, C. & Pyle, K. 2010. *A literature review of Assessment for Learning in science,* Slough: Nfer

Hofferth, S. L. 2005. Secondary data analysis in family research. *Journal of Marriage and Family,* 67, 891-907.

Holcomb, E. L. 1999. *Getting excited about data: How to combine people, passion, and proof,* Thousand Oaks, CA: Corwin Press.

Honig, M. I. & Coburn, C. 2007. Evidence-based decision making in school district central offices: Toward a policy and research agenda. *Educational Policy,* 22, 578-608.

Hoogland, I., Schildkamp, K., Van Der Kleij, F., Heitink, M., Kippers, W., Veldkamp, B. & Dijkstra, A. M. 2016. Prerequisites for data-based decision making in the classroom: Research evidence and practical illustrations. *Teaching and Teacher Education.* 60, 3770386

Hoover, N. R. & Abrams, L. M. 2013. Teachers' instructional use of summative student assessment data. *Applied Measurement in Education*, 26, 219-231.

Horgan, D., Forde, C., Parkes, A. & Martin, S. 2015. *Children and young people's experiences of participation in decision-making at home, in schools and in their communities*. Dublin: Department of Children and Youth Affairs.

Hout, M. & Elliott, S. W. 2011. *Incentives and test-based accountability in education,* Washington, DC: National Academies Press.

Howley, A., Woodrum, A., Burgess, L. & Rhodes, M. 2009. Planning for culturally responsive leadership: Insights from a study of principals of exemplary schools. *Educational Planning,* 18, 12-26.

Hoy, W. K. & Miskel, C. G. 2008. *Educational administration: Theory, research, and practice,* Cambridge, MA: McGraw-Hill.

Huffman, D. & Kalnin, J. 2003. Collaborative inquiry to make data-based decisions in schools. *Teaching and Teacher Education,* 19, 569-580.

Huguet, A., Marsh, J. A. & Farrell, C. C. 2015. Building Teachers' Data-Use Capacity: Insights from Strong and Developing Coaches. *Education policy analysis archives*, 22, 1-26.

Hunter-Carsch, M. 2006. *The handbook of social emotional, and behavioural difficulties,* London: Continuum.

Ikemoto, G. S. & Marsh, J. A. 2007. Cutting through the" Data-Driven" Mantra: Different Conceptions of Data-Driven Decision Making. *Yearbook of the National Society for the Study of Education, 106, 105-131.*

Ingram, D., Seashore Louis, K. & Schroeder, R. 2004. Accountability policies and teacher decision making: Barriers to the use of data to improve practice. *The Teachers College Record,* 106, 1258-1287.

Jacob, B. & Lefgren, L. 2008. Can principals identify effective teachers? Evidence on subjective performance evaluation in education. *Journal of Labor Economics,* 26, 101-136.

James, M., Black, P., Carmichael, P., Conner, C., Dudley, P., Fox, A., Frost, D., Honour, L., *MacBeath*, J., Marshall, B. & Mccormick, R. 2006. *Learning how to learn: tools for schools.* New York: Routledge.

Jimerson, J. B. & Wayman, J. C. 2015. Professional learning for using data: Examining teacher needs and supports. *Teachers College Record,* 117, 1-36.

Johnson Jr, B. L. & Kruse, S. D. 2012. *Decision making for educational leaders: Underexamined dimensions and issues,* Albany, NY: SUNY Press.

Johnson, R. B. & Onwuegbuzie, A. J. 2004. Mixed methods research: A research paradigm whose time has come. *Educational Researcher,* 33, 14-26.

Johnson, R. S. 2002. *Using data to close the achievement gap: How to measure equity in our schools,* Thousand Oaks, CA: Corwin Press.

Johnston, M. P. 2014. Secondary data analysis: A method of which the time has come. *Qualitative and Quantitative Methods in Libraries,* 3, 619-626.

Julnes, G. & Rog, D. 2009. Evaluation methods for producing actionable evidence. What counts as credible evidence in applied research and evaluation practice, IN: Donaldson, S.L., Christie, C.A., Mark, M.M., *What Counts as Credible Evidence in Applied Research and Evaluation Practice?* 96-131. New York: SAGE,

Katz, S. & Dack, L. A. 2014. Towards a culture of inquiry for data use in schools: Breaking down professional learning barriers through intentional interruption. *Studies in Educational Evaluation,* 42, 35-40.

Kennedy, B. L. & Datnow, A. 2010. Student involvement and data-driven decision making: Developing a new typology. *Youth & Society,* 43, 1246-1271.

Kerr, K. A., Marsh, J. A., Ikemoto, G. S., Darilek, H. & Barney, H. 2006. Strategies to promote data use for instructional improvement: Actions, outcomes, and lessons from three urban districts. *American Journal of Education*, 112, 496-520.

Killion, J. 2015. High-Quality Collaboration Benefits Teachers and Students: Lessons from Research. *Journal of Staff Development,* 36, 62-64.

Killion, J. & Bellamy, G. T. 2000. On the Job. *Journal of Staff Development*, 21, 27-31.

Kirkup, C. 2006. Using assessment information to inform teaching and learning. *Education 3–13*, 34, 153-162.

Klenowski, V. & Wyatt-Smith, C. 2013. *Assessment for education: Standards, judgement and moderatio.,* London: SAGE.

Knapp, M. S., Swinnerton, J. A., Copland, M. A. & Monpas-Huber, J. 2006. *Data-Informed Leadership in Education.* Seattle, WA: Center for the Study of Teaching and Policy.

Kolb, D. A. & Fry, R. E. 1974. *Toward an applied theory of experiential learning,* Cambridge, MA: Sloan School of Management.

Koretz, D. 2003. Using multiple measures to address perverse incentives and score inflation. *Educational Measurement: Issues and Practice,* 22, 18-26.

Kowalski, T. & Lasley, T. J. 2009. *Handbook of data-based decision making in education,* New York: Routledge.

Kowalski, T. J., Lasley, T. J. & Mahoney, J. W. 2008. *Data-driven decisions and school leadership: Best practices for school improvement,* Boston: MA: Pearson Education.

Krauss, S. E. 2005. Research paradigms and meaning making: A primer. *The Qualitative Report,* 10, 758-770.

Kvale, S. 2007. *Doing interviews,* New York: SAGE.

Lachat, M. A. & Smith, S. 2004. *Data use in urban high schools*, Providence, RI: Education Alliance, Brown University, Northeast and Islands Regional Educational Laboratory.

Lachat, M. A. & Smith, S. 2005. Practices that support data use in urban high schools. *Journal of Education for Students Placed at Risk,* 10, 333-349.

Lai, M. K. & Schildkamp, K. 2013. *Data-based decision making: An overview. Data-based decision making in education*. Dordtrecht: Springer.

Lange, D. 1988. *Tomorrow's schools: The reform of education administration in New Zealand,* Aukland:, Department of Education.

Lawn, M. & Ozga, J. 2009. *The sleep of reason breeds monsters: Data and education governance in England,* Edinburgh: CES.

Leedy, P. D. & Ormrod, J. E. 2015. *Practical research: Planning and design*, Harlow: Pearson.

Leithwood, K., Aitken, R. & Jantzi, D. 2006. Making schools smarter: Leading with evidence, Thousand Oaks, CA: Corwin Press.

Leithwood, K. & Day, C. 2007. Successful principal leadership in times of change. *Studies in Educational Leadership,* Dordrecht: Springer

Leithwood, K., Harris, A. & Hopkins, D. 2008. Seven strong claims about successful school leadership. *School Leadership and Management,* 28, 27-42.

Leithwood, K., Seashore Louis, K., Anderson, S. & Wahlstrom, K. 2004. *Review of research: How leadership influences student learning,* Minneapolis, MN: University of Minnesota.

Leithwood, K. A. & Riehl, C. 2003. *What we know about successful school leadership,* Nottingham: National College for School Leadership

Levin, B., Datnow, A. & Carrier, N. 2012. *Changing school district practices. Jobs for the Future*, Boston, MA: Nellie Mae Education Foundation

Lincoln, Y. S. & Denzin, N. K. 2003. Turning points in qualitative research: Tying knots in a handkerchief, *Contemporary Sociology: A Journal of Reviews,* 33, 738-739

Lingard, B. & Lewis, S. 2016. Globalization of the Anglo-American approach to top-down, test-based educational accountability. *IN:* Brown, G & Harris L.R. *Handbook of Human and Social Conditions in Assessment*, New York: Routledge

Looney, A. 2006. Assessment in the Republic of Ireland. *Assessment in Education,* 13, 345-353.

Louis, K. S., Leithwood, K., Wahlstrom, K. L., Anderson, S. E., Michlin, M., Mascall, B., Gordon, M., Thomas, E., Tiiu, S. & Moore, S. 2010. *Learning from leadership: Investigating the links to improved student learning*. Toronto: Center for Applied Research and Educational Improvement/University of Minnesota and Ontario Institute for Studies in Education/University of Toronto.

Love, N. 2009. *Using data to improve learning for all: A collaborative inquiry approach,* Thousand Oaks, CA: Corwin Press.

Love, N., Stiles, K. E., Mundry, S. & Diranna, K. 2008. *The data coach's guide to improving learning for all students: Unleashing the power of collaborative inquiry,* Thousand Oaks, CA: Corwin Press.

Luo, M. 2008. Structural equation modeling for high school principals' data-driven decision making: an analysis of information use environments. *Educational Administration Quarterl*y, 44, 603-634.

Luo, M. 2015. Factors Related To Data Use In Instructional Leadership: The Importance Of Data Literacy In Leadership Education. *International Journal of Teaching and Education,* 3, 24-44.

Lyons, M., Lynch, K., Close, S., Sheerin, E. & Boland, P. 2003. *Inside classrooms: The teaching and learning of mathematics in social context*. Dublin: Institute of Public Administration.

Lysaght, Z. & O'leary, M. 2013. An instrument to audit teachers' use of assessment for learning. *Irish Educational Studies*, 32, 217-232.

MA: J. 2012. *The House Advantage: Playing the Odds to Win Big in Business*, New York: Palgrave Macmillan.

MacBeath, J. 1999. *Schools must speak for themselves: The case for school self-evaluation,* London: Routledge.

MacBeath, J. 2005. *Background, principles and key learning in self-evaluation: a guide for school leaders.* Nottingham: National College for School Leadership

MacBeath, J. 2009. *Self-evaluation for school improvement. Second international handbook of educational change.* Dordrecht: Springer.

MacBeath, J. 2013. *Learning in and out of school: the selected works of John MacBeath,* London: Routledge.

MacBeath, J. & Mortimore, P. 2001. *Improving school effectiveness,* Maidenhead, Open University Press.

Mack, L. 2010. The philosophical underpinnings of educational research. *Polyglossia,* 19, 1-11.

Mandinach, E. B. & Gummer, E. S. 2012. *Navigating the landscape of data literacy: It IS complex.* Washington, DC and Portland, OR: WestEd and Education Northwest.

Mandinach, E. B. & Gummer, E. S. 2013. A systemic view of implementing data literacy in educator preparation. *Educational Researcher,* 42, 30-37.

Mandinach, E. B. & Gummer, E. S. 2016. *Data Literacy for Educators: Making It Count in Teacher Preparation and Practice,* New York: Teachers College Press.

Mandinach, E. B. & Honey, M. 2008. *Data-driven school improvement: linking data and learning,* New York: Teachers College Press.

Mandinach, E. B., Honey, M. & Light, D. 2006. A theoretical framework for data-driven decision making. Annual meeting of the American Educational Research Association, San Francisco, CA: AERA.

Mandinach, E. B. & Jackson, S. S. 2012. *Transforming teaching and learning through data-driven decision making,* Thousand Oaks, CA: Corwin Press.

Mandinach, E. B. & Jimerson, J. B. 2016. Teachers learning how to use data: A synthesis of the issues and what is known. *Teaching and Teacher Education,* 60, 452–457.

Marsh, J. A. 2012. Interventions to promote data use: An introduction. *Teachers College Record.* 114, 11, 1-13

Marsh, J. A., Bertrand, M. & Huguet, A. 2015. Using Data to Alter Instructional Practice: The Mediating Role of Coaches and Professional Learning Communities. *Teachers College Record,* 117, 1-40

Marsh, J. A. & Farrell, C. C. 2014. How leaders can support teachers with data-driven decision making A framework for understanding capacity building. *Educational Management Administration & Leadership*, 43, 269-289.

Marsh, J. A., Pane, J. F. & Hamilton, L. S. 2006. Making sense of data-driven decision making in education.

Masha, E. M. 2014. The Case for Data Driven Strategic Decision Making. *European Journal of Business*. 6, 137-146.

Mason, J. 2002. *Qualitative researching,* London: SAGE.

Matthews, P. & Lewis, P. 2009. *How do school leaders successfully lead learning?* Nottingham: National College for School Leadership

McKenna, M. K. & Millen, J. 2013. Look! Listen! Learn! Parent narratives and grounded theory models of parent voice, presence, and engagement in K-12 education. *School Community Journal,* 23, 9.

McMillan, J. H. 2012. *SAGE Handbook of Research on Classroom Assessment*, Los Angeles, CA:SAGE.

McNamara, G. & O'Hara, J. 2005. Internal review and self-evaluation—the chosen route to school improvement in Ireland? *Studies in Educational Evaluation,* 31, 267-282.

McNamara, G. & O'Hara, J. 2008. *Trusting schools and teachers: Developing educational professionalism through self-evaluation,* New York: Peter Lang.

McNamara, G. & O'Hara, J. 2006. Workable compromise or pointless exercise? School-based evaluation in the Irish context. *Educational Management Administration & Leadership,* 34, 564-582.

McNamara, G. & O'Hara, J. 2008. The importance of the concept of self-evaluation in the changing landscape of education policy. *Studies in Educational Evaluation*, 34, 173-179.

McNamara, G. & O'Hara, J. 2012. From looking at our schools (LAOS) to whole school evaluation-management, leadership and learning (WSE-MLL): the evolution of inspection in Irish schools over the past decade. *Educational Assessment, Evaluation and Accountability,* 24, 79-97.

Mcniff, J. 2013. *Action research: Principles and practice*, London: Routledge.

Means, B., Padilla, C., Debarger, A. & Bakia, M. 2009. *Implementing Data-Informed Decision Making in Schools: Teacher Access, Supports and Use*. Washington, DC: US Department of Education.

Means, B., Padilla, C. & Gallagher, L. 2010. *Use of Education Data at the Local Level: From Accountability to Instructional Improvement*. Washington, DC: US Department of Education.

Menter, I. 2015. UK and Irish teacher education in a time of change. IN: *Teacher Education in Times of Change*, Bristol: Policy Press

Merriam, S. B. & Tisdell, E. J. 2015. *Qualitative research: A guide to design and implementation,* Chichester: John Wiley & Sons.

Mills, M., Goos, M., Monk, S., Muspratt, S., Renshaw, P., Gilbert, R., Dole, S., Honan, E., Nichols, K. & Wright, T. 2012. *A curriculum in transition: Final report for the Queensland Curriculum, Assessment and Reporting Framework (QCAR): Evaluation.* Brisbane: University of Queensland

Mokhtari, K., Rosemary, C. A. & Edwards, P. A. 2007. Making instructional decisions based on data: What, how, and why. *The Reading Teacher,* 61, 354-359.

Morris, A. 2011. Student Standardised Testing: Current Practices in OECD Countries and a Literature Review. OECD Education Working Papers No. 65. Paris: OECD Publishing.

Mottier Lopez, L. & Morales Villabona, F. 2016. Teachers' Professional Development in the Context of Collaborative Research: Toward Practices of Collaborative Assessment for Learning in the Classroom. *IN:* Laveault, D. & Allal, L. (eds.) *Assessment for Learning: Meeting the Challenge of Implementation.* Cham: Springer.

Mullis, I. V. S., Martin, M. O., Foy, P. & Arora, A. 2012. *TIMSS 2011 International results in mathematics,* Boston: MA: TIMSS & PIRLS International Study Center.

Murray, J. 2013. Critical issues facing school leaders concerning data-informed decision-making. *School Leadership & Management,* 33, 169-177.

Nayir, K. F. & McNamara, G. 2014. The Increasingly Central Role of School Self-Evaluation in Inspection Systems across Europe: The Case of Ireland. *Turkish Journal of Education,* 3. 48-59

NCCA 2002. *Developing Senior Cycle Education: consultative paper on issues and options.* Dublin: National Council for Curriculum and Assessment.

NCCA 2007. *Guidelines for teachers of students with general learning disabilities*. Dublin: National Council for Curriculum and Assessment.

NCCA 2011. *Towards A Framework for Junior Cycle.* Dublin: NCCA.

Nelson, R., Ehren, M. & Godfrey, D. 2015. *Literature Review on Internal Evaluation.* London: UCL Institute of Education. Available:

Nor, M. Y. M. 2014. Potentials of contextual value-added measures in assisting schools become more effective. 7, 75.

O'day, J. 2002. Complexity, accountability, and school improvement. *Harvard Educational Review,* 72, 293-329.

O'Mara-Eves, A., Akre, B., Munton, T., Marrero-Guillamón, I., Martin, A., Gibson, K., Llewellyn, A., Clift-Matthews, V., Conway, P. & Cooper, C. 2012. *Curriculum and curriculum access issues for students with special educational needs in post-primary settings: An international Review.* Trim: NCSE

O'Brien, S., McNamara, G. & O'Hara, J. 2015. Supporting the consistent implementation of self-evaluation in Irish post-primary schools. *Educational Assessment, Evaluation and Accountability,* 27, 377-393.

OECD 2005. *Formative assessment: Improving learning in secondary classrooms*. Paris: OECD.

OECD 2009. *Creating effective teaching and learning environments: First results from TALIS*, Paris: OECD.

OECD 2010. *Education at a Glance 2010*, Paris: OECD.

Owens, R. G. 2004. *Decision making. Organizational behaviour in education,* Boston: Allyn and Bacon

Park, V. & Datnow, A. 2008. Collaborative assistance in a highly prescribed school reform model: The case of success for all. *Peabody Journal of Education,* 83, 400-422.

Park, V. & Datnow, A. 2009. Co-constructing distributed leadership: District and school connections in data-driven decision-making. *School leadership and Management*, 29, 477-494.

Parveva, T., De Coster, I. & Noorani, S. 2009. *National Testing of Pupils in Europe: Objectives, Organisation and Use of Results,* Brussels, Eurydice.

Parylo, O. & Zepeda, S. J. 2014. Describing an 'effective'principal: Perceptions of the central office leaders. *School Leadership & Management,* 34, 518-537.

Patton, M. Q. 2015. *Qualitative research & evaluation methods: Integrating theory and practice*, Thousand Oaks, CA: SAGE.

PDST 2016. *Senior Cycle Subject Analysis Spreadsheets* [Online]. Dublin: PDST. Available: http://PDST.ie/postprimary [Accessed Web Page 2016].

Pegram, A. 2000. What is case study research? *Nurse Researcher,* 7, 5-18.

Perkins, R. 2012. *PISA 2009: Results for Ireland and changes since 2000,* Dublin: Educational Research Centre.

Picciano, A. G. 2006. *Data-driven decision making for effective school leadership,* Englewood Cliffs, NJ: Prentice-Hall.

Piro, J. S., Dunlap, K., Shutt, T. & Gritter, K. 2014. A collaborative Data Chat: Teaching summative assessment data use in pre-service teacher education. *Cogent Education,* 3, 1-24

Poortman, C. 2015. Factors influencing the functioning of data teams. *Teachers college record,* 117, 1-31

Poortman, C. L., Schildkamp, K. & Lai, M. K. 2016. Professional development in data use: An international perspective on conditions, models, and effects. *Teaching and Teacher Education.* 60, 363-365.

Prinsloo, P. & Slade, S. 2015. Student privacy self-management: implications for learning analytics. Proceedings of the Fifth International Conference on Learning Analytics and Knowledge, Poughkeepsie, NY. ACM, 83-92.

Prinsloo, P. & Slade, S. 2016. Student Vulnerability, Agency, and Learning Analytics: An Exploration. *Journal of Learning Analytics*, 3, 159-182.

Pynoo, B., Devolder, P., Tondeur, J., Van Braak, J., Duyck, W. & Duyck, P. 2011. Predicting secondary school teachers' acceptance and use of a digital learning environment: A cross-sectional study. *Computers in Human Behavior*, 27, 568-575.

Quinn, G. 2015. *Junior cycle campaign success from imposition to negotiation.* Dublin: TUI.

Ray, A. 2006. School value added measures in England. A paper for the OECD Project on the Development of Value-Added Models in Education Systems. Paris: OECD.

Reeves, D. B. 2004. *Accountability for learning: How teachers and school leaders can take charge,* Alexandria, VA, ASCD.

Reeves, P. L. & Burt, W. L. 2006. Challenges in data-based decision-making: Voices from principals. Educational Horizons, 85, 65-71.

Renshaw, P., Baroutsis, A., Van Kraayenord, C., Goos, M. & Dole, S. 2013. *Teachers using classroom data well: Identifying key features of effective practice.* Brisbane: University of Queensland.

Ritchie, J., Lewis, J., Nicholls, C. M. & Ormston, R. 2013. *Qualitative research practice: A guide for social science students and researchers,* Los Angeles, CA: SAGE.

Romero, C. & Ventura, S. 2007. Educational data mining: A survey from 1995 to 2005. *Expert Systems with Applications*, 33, 135-146.

Rosenkvist, M. A. 2010. *Using Student Test Results for Accountability and Improvement.* Paris: OECD.

Ryan, M. C. 2014. Exploring data use among teachers in the Republic of Ireland. The *European Journal of Social & Behavioural Sciences,* 9, 1374-1382.

Sahlberg, P. 2011. *Finnish lessons,* New York: Teachers College Press.

Saunders, L. 2000. Understanding schools' use of 'value added'data: the psychology and sociology of numbers. *Research Papers in Education,* 15, 241-258.

Schildkamp, K. 2007. *The utilisation of a self-evaluation instrument for primary education* Accessed on-line http://doc.utwente.nl/57803/1/thesis_Schildkamp.pdf on 24/07/2015, Enshede: University of Twente.

Schildkamp, K., Karbautzki, L. & Vanhoof, J. 2013a. Exploring data use practices around Europe: Identifying enablers and barriers. *Studies in Educational Evaluation*, 42, 15-24.

Schildkamp, K. & Kuiper, W. 2010. Data-informed curriculum reform: Which data, what purposes, and promoting and hindering factors. *Teaching and Teacher Education*, 26, 482-496.

Schildkamp, K., Lai, M. K. & Earl, L. 2012a. *Data-based decision making in education: Challenges and opportunities,* Dortrecht, Springer.

Schildkamp, K., Lai, M. K. & Earl, L. 2013b. *Data-based decision making in education: Challenges and opportunities*, Dordrecht, Springer.

Schildkamp, K., Poortman, C. L. & Handelzalts, A. 2015. Data teams for school improvement. *School Effectiveness and School Improvement,* 27, 228-254.

Schildkamp, K., Rekers-Mombarg, L. T. M. & Harms, T. J. 2012b. Student group differences in examination results and utilization for policy and school development. *School Effectiveness and School Improvement*, 23, 229-255.

Schildkamp, K. & Teddlie, C. 2008. School performance feedback systems in the USA and in The Netherlands: A comparison. *Educational Research and Evaluation,* 14, 255-282.

Schildkamp, K. & Visscher, A. 2014. Data-centered school self-evaluation in the Netherlands: Characteristics and prerequisites. IN: *Lai, M. & Kushner S. A Developmental and Negotiated Approach to School Self-Evaluation (Advances in Program Evaluation, Volume 14)* Emerald Group Publishing Limited, 14, 233-252.

Schmoker, M. 2003. First Things First: Demystifying Data Analysis. *Educational Leadership,* 60, 22-24.

Schön, D. A. 1983. *The reflective practitioner: How professionals think in acti*on, New York: Basic books.

Schulz, W., Ainley, J., Fraillon, J., Kerr, D. & Losito, B. 2009. Civic Knowledge, Attitudes, and Engagement among Lower-Secondary School Students in 38 Countries. ICCS Conference, Amsterdam: International Association for the Evaluation of Educational Achievement.

SEC 2016. *State Examinations Statistics* [Online]. Athlone: State Examination Commission,. Available: https://www.examinations.ie/?l=en&mc=st&sc=r16 [Accessed Web Page 2016].

Selwyn, N., Henderson, M. & Chao, S. H. 2015. Exploring the role of digital data in contemporary schools and schooling—'200,000 lines in an Excel spreadsheet'. *British Educational Research Journal,* 41, 767-781.

Senge, P. M., Cambron-Mccabe, N., Lucas, T., Smith, B. & Dutton, J. 2012. *Schools that learn: A fifth discipline fieldbook for educators, parents, and everyone who cares about education*, Boston: MA: Nicholas Brealey Publishing.

Shah, M. 2014. Impact of management information systems (MIS) on school administration: What the literature says. *Procedia-Social and Behavioral Sciences,* 116, 2799-2804.

Shahjahan, R. A. 2011. Decolonizing the evidence-based education and policy movement: revealing the colonial vestiges in educational policy, research, and neoliberal reform. *Journal of Education Policy,* 26, 181-206.

Sharratt, L. & Planche, B. 2016. *Leading collaborative learning: Empowering excellence,* Thousand Oaks, CA: Corwin Press.

Shen, J. & Cooley, V. E. 2008. Critical issues in using data for decision-making. *International Journal of Leadership in Education*, 11, 319-329.

Shen, J., Cooley, V. E., Reeves, P., Burt, W. L., Ryan, L., Rainey, J. M. & Yuan, W. 2010. Using data for decision-making: Perspectives from 16 principals in Michigan, USA. International Review of Education, 56, 435-456.

Shevlin, M., Winter, E. & Flynn, P. 2013. Developing inclusive practice: teacher perceptions of opportunities and constraints in the Republic of Ireland. *International Journal of Inclusive Education,* 17, 1119-1133.

Siemens, G. 2013. Learning analytics: The emergence of a discipline. *American Behavioral Scientist*, 57, 1380-1400.

Silliman, M. I. 2015. *The use of data in the governance of education.* Paris: OECD.

Silverman, D. 2009. *Doing qualitative research,* London: SAGE.

Slavin, R. E. 2002. Evidence-based education policies: Transforming educational practice and research. *Educational Researcher,* 31, 15-21.

Slavin, R. E. 2003. A reader's guide to scientifically based research. *Educational Leadership,* 60, 12-16.

Smith, A. 2004. *Making mathematics count: The report of Professor Adrian Smith's inquiry into post-14 mathematics education*. London: Department of Education.

Smith, A. & Thomas, N. 2006. Including pupils with special educational needs and disabilities in national curriculum physical education: A brief review. *European Journal of Special Needs Education,* 21, 69-83.

Smith, A. K., Ayanian, J. Z., Covinsky, K. E., Landon, B. E., Mccarthy, E. P., Wee, C. C. & Steinman, M. A. 2011. Conducting high-value secondary dataset analysis: an introductory guide and resources. *Journal of General Internal Medicine,* 26, 920-929.

Smith, E. 2008. Pitfalls and promises: The use of secondary data analysis in educational research. *British Journal of Educational Studies,* 56, 323-339.

Smith, M. 2005. *Data for schools in NSW: What is provided and can it help? Using Data to Support Learning.* Melb ourne, Australian: Council for Educational Research.

Smyth, E. 1999. *Do schools differ?* Dublin: Economic and Social Research Institute.

Smyth, E. 2007. *Gearing Up for the Exam? The Experience of Junior Certificate Students,* Dublin: Liffey Press.

Smyth, E. 2009. Junior cycle education: Insights from a longitudinal study of students. *ESRI Research Bulletin,* 4, 1-5.

Smyth, E. 2011. *Choices and challenges: Moving from junior cycle to senior cycle education.* Dublin: Liffey Press.

Smyth, E., Banks, J. & Calvert, E. 2011. *From Leaving Certificate to leaving school: a longitudinal study of sixth year students*. Dublin: Liffey Press.

Smyth, E., McCoy, S. & Kingston, G. 2015. *Learning from the Evaluation of DEIS*. Dublin: ESRI.

Smyth, J. 2006. Educational leadership that fosters 'student voice'. *International Journal of Leadership in Education,* 9, 279-284.

Spillane, J. P. 2012. Data in practice: Conceptualizing the data-based decision-making phenomena. *American Journal of Education*, 118, 113-141.

Spillane, J. P., Halverson, R. & Diamond, J. B. 2004. Towards a theory of leadership practice: A distributed perspective. *Journal of curriculum studies,* 36, 3-34.

Stake, R. E. 1995. *The art of case study research*, Thousand Oaks, CA:SAGE.

Staman, L., Visscher, A. J. & Luyten, H. 2012. The effects of training school staff for utilizing student monitoring system data. *IN*: *Passey, D., Breiter, A. & Visscher, A. J., (eds). IFIP Conference on Information Technology in Educational Management*, Bremen. Springer, 3-14.

Staman, L., Visscher, A. J. & Luyten, H. 2014. The effects of professional development on the attitudes, knowledge and skills for data-driven decision making. *Studies in Educational Evaluation,* 42, 79-90.

Starratt, R. J. 2005. Responsible leadership. *The Educational Forum,* 69, 124-133.

Stiggins, R. J. 1991. Assessment Literacy. *Phi Delta Kappan,* 72, 534-39.

Stiggins, R. J. 1994. *Student-centered classroom assessment,* New York: Merrill

Stiggins, R. J. 2001. The unfulfilled promise of classroom assessment. Educational *Measurement: Issues and Practice*, 20, 5-15.

Stiggins, R. J. 2002. Assessment crisis: The absence of assessment for learning. *Phi Delta Kappan,* 83, 758-765.

Stiggins, R. J. 2007. Conquering the formative assessment frontier. IN: McMillian, J. (ed.) Formative classroom assessment: Theory into practice, New York: Teachers College Press.

Stobart, G. 2008. *Testing times: The uses and abuses of assessment*, London: Routledge.

Stroggilos, V. & Xanthacou, Y. 2006. Collaborative IEPs for the education of pupils with profound and multiple learning difficulties. *European Journal of Special Needs Education,* 21, 339-349.

Supovitz, J. A. & Klein, V. 2003. Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement.

Talem, M. 1999. A case study of the impact of school administration computerization on the department head's role. *Journal of Research on Computing in Education,* 31, 385-401.

Tan, H. C., Anumba, C. J., Carrillo, P. M., Bouchlaghem, D., Kamara, J. & Udeaja, C. 2009. *Capture and reuse of project knowledge in construction,* Chichester, John Wiley & Sons.

Teaching Council 2016. *Cosán. Framework for Teachers' Learning*. Kildare: The Teaching Council.

The Inspectorate 2013. *Promoting the quality of learning, Chief Inspector's Report 2010 - 2011.* Dublin: DES.

The Inspectorate. 2016. Inspectorate publications [Online]. Dublin: DES. Available: http://www.education.ie/en/Publications/Inspection-Reports-Publications/Evaluation-Reports-Guidelines/ [Accessed 01/10/2016].

Tusla. 2016. *Research and Statistics* [Online]. Dublin: TUSLA. Available: http://www.tusla.ie/services/educational-welfare-services/publications/research-and-statistics [Accessed 01/10/2016].

Valli, L., Croninger, R. G. & Walters, K. 2007. Who (else) is the teacher? Cautionary notes on teacher accountability systems. *American Journal of Education*, 113, 635-662.

Van Der Kleij, F. M., Eggen, T. J. H. M. & Engelen, R. J. H. 2014. Towards valid score reports in the Computer Program LOVS: A redesign study. *Studies in Educational Evaluation,* 43, 24-39.

Van Der Kleij, F. M., Vermeulen, J. A., Schildkamp, K. & Eggen, T. J. H. M. 2015. Integrating data-based decision making, Assessment for Learning and diagnostic testing in formative assessment. *Assessment in Education: Principles, Policy & Practice,* 22, 324-343.

Vanover, C. & Hodges, O. 2015. Teaching data use and school leadership. . *School Leadership & Management,* 35, 17-38.

Vaughn, S., Schumm, J. S. & Sinagub, J. M. 1996. *Focus group interviews in education and psychology,* London: SAGE.

Vermeulen, J. A. & Kleij, F. M. 2012. Towards an integrative formative approach of data-driven decision making, assessment for learning, and diagnostic testing. IN: *Eggen, T.J. and Veldkamp, B.P. Psychometrics in practice at RCEC,* 162-185. Enschede: University of Twente.

Visscher, A. J. & Coe, R. 2013. *School improvement through performance feedback,* London: Routledge.

Walumbwa, F. O., Avolio, B. J., Gardner, W. L., Wernsing, T. S. & Peterson, S. J. 2007. Authentic Leadership: Development and Validation of a Theory-Based Measure. Journal of Management, 34, 89-126.

Watty, K., Freeman, M., Howieson, B., Hancock, P., O'connell, B., De Lange, P. & Abraham, A. 2014. Social moderation, assessment and assuring standards for accounting graduates. *Assessment & Evaluation in Higher Education*, 39(4), 461-478.

Wayman, J. C. 2005. Involving teachers in data-driven decision making: Using computer data systems to support teacher inquiry and reflection. *Journal of Education for Students Placed at Risk,* 10, 295-308.

Wayman, J. C., Cho, V., Jimerson, J. B. & Spikes, D. D. 2012a. District-Wide Effects on Data Use in the Classroom. Education Policy Analysis Archives, 20, 1-31.

Wayman, J. C. & Jimerson, J. B. 2014. Teacher needs for data-related professional learning. *Studies in Educational Evaluation*, 42, 25-34.

Wayman, J. C., Jimerson, J. B. & Cho, V. 2011. Organizational considerations in educational data use. Annual Meeting of the American Educational Research Association, New Orleans LA: AERA.

Wayman, J. C., Jimerson, J. B. & Cho, V. 2012b. Organizational considerations in establishing the data-informed district. *School Effectiveness and School Improvement,* 23, 159-178.

Wayman, J. C., Midgley, S. & Stringfield, S. 2006. Leadership for data-based decision-making: Collaborative educator teams. IN: *Danzig, AB., Learner Centered leadership: Research, policy, and practice,* 189-206. Mahwah, NJ: Lawrence Erlbaum Associates

Wayman, J. C., Spring, S. D., Lemke, M. A. & Lehr, M. D. 2012c. Using data to inform practice: effective principal leadership strategies. Annual Meeting of the American Educational Research Association, Vancouver: AERA.

Wayman, J. C. & Stringfield, S. Teacher-friendly options to improve teaching through student data analysis. 10th annual meeting of the American Association for Teaching and Curriculum, 2003 Baltimore, MD.: AATC

Wayman, J. C. & Stringfield, S. 2006. Data use for school improvement: School practices and research perspectives. *American Journal of Education*, 112, 463-468.

Wayman, J. C., Stringfield, S. & Yakimowski, M. 2004. *Software enabling school improvement through analysis of student data*. Baltimore, MD: Johns Hopkins University.

Weathers, R. 2013. Top Four Trends in Student Information Systems. *School Business Affairs,* 79, 27-29.

Welsh, E. 2002. *Dealing with data: Using NVivo in the qualitative data analysis process.* Forum Qualitative Sozialforschung/Forum: Qualitative Social Research [Online], 2016. Available: http://nbn-resolving.de/urn:nbn:de:0114-fqs0202260 [Accessed 05/07/2016].

Whitehurst, G. J. 2007. *Evidence-based education* [Online]. Available: http://www.ed.gov/nclb/methods/whatworks/eb/evidencebased.pdf [Accessed 05/05 2016].

Wilhelm, T. 2011. A Team Approach to Using Student Data. *Leadership,* 40, 26.

Wiliam, D. 2011. What is assessment for learning? *Studies in Educational Evaluation*, 37, 3-14.

Wohlstetter, P., Datnow, A. & Park, V. 2008. Creating a system for data-driven decision-making: Applying the principal-agent framework. *School Effectiveness and School Improvement,* 19, 239-259.

Wrigley, T. 2013. Rethinking school effectiveness and improvement: a question of paradigms. Discourse: *Studies in the Cultural Politics of Education*, 34, 31-47.

Xu, Y. & Brown, G. T. L. 2016. Teacher assessment literacy in practice: A reconceptualization. *Teaching and Teacher Education,* 58, 149-162.

Yin, R. K. 2014. *Case study research: Design and methods,* Thousand Oaks, CA: SAGE.

Yoon, S. Y. 2016. Principals' Data-Driven Practice and Its Influences on Teacher Buy-in and Student Achievement in Comprehensive School Reform Models. *Leadership and Policy in Schools,* 15, 500-523.

Young, V. M. 2006. Teachers' use of data: Loose coupling, agenda setting, and team norms. *American Journal of Education*, 112, 521-548.

Young, V. M. & Kim, D. H. 2010. Using assessments for instructional improvement: A literature review. *Education Policy Analysis Archives,* 18, 1.

Appendices

Appendix I

Multiple measures of data

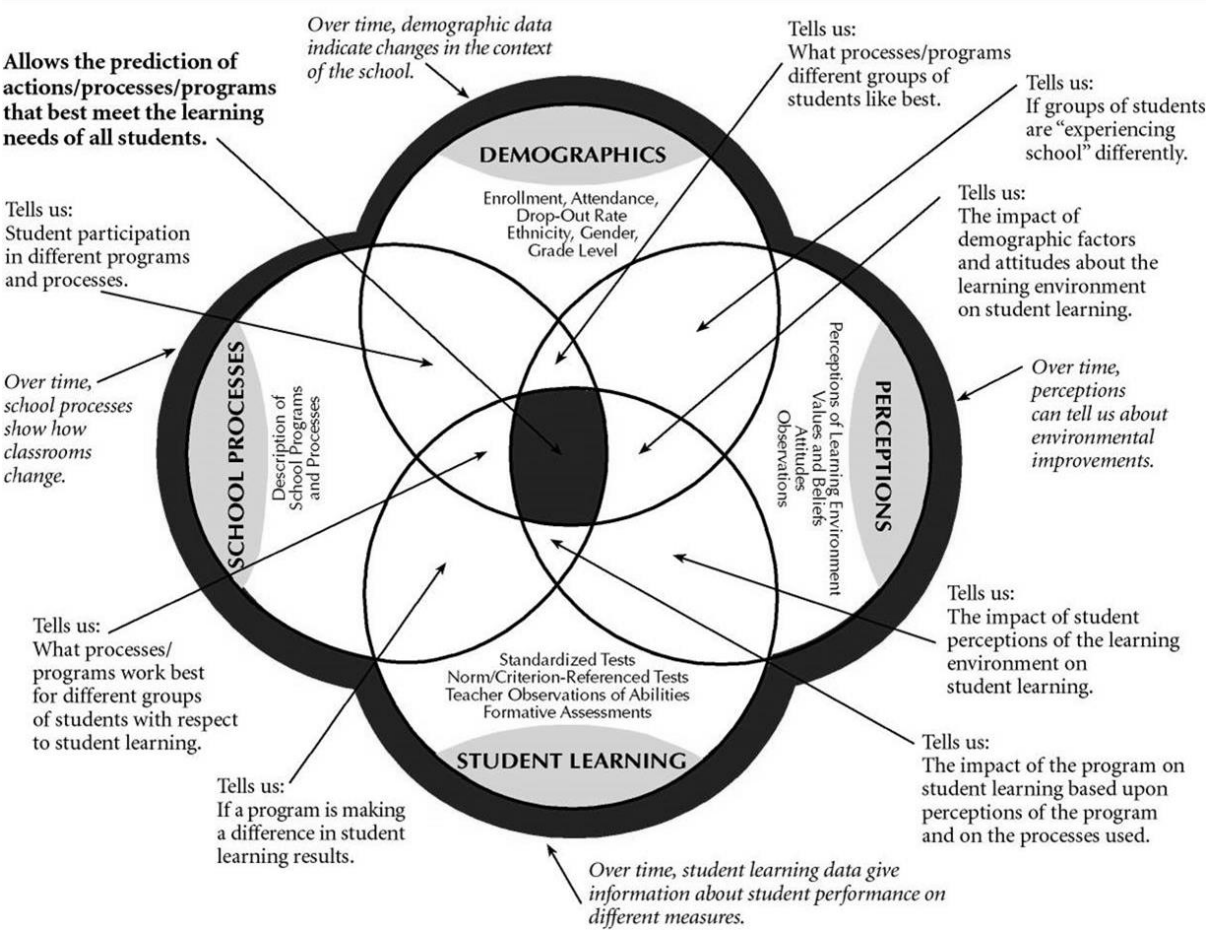


Figure 1 Multiple measures of data: Bernhardt (2013, p17)

Some examples of demographic data include

- Enrolment history
- Gender
- Date of birth
- Attendance (absences)
- Expulsions/Suspensions
- Socio-economic status
- First language
- Previous schools
- Special education needs

It is best to look longitudinally, over at least three to five years, in order to recognise trends (Bernhardt, 2013).

Sources of perception data include

- Student, staff and parent questionnaires
- Observations
- Focus groups
- DES; MLL Questionnaires

Examining a combination of demographics and perception data can show how different groups of students experience school differently.

Measures of student-learning may include:

- Classroom assessments
- Term Exams
- Formative assessments
- International assessments
- Standardised Tests
- Student Reports
- Project completions
- Teacher observations of abilities

Examining a combination of student-learning data and perception data can indicate the influence of student perceptions of the learning environment on student learning. Factoring in demographic data will indicate the impact of demographic factors and attitudes on learning. Researchers in Ireland and Internationally (Smyth, 1999, Eivers et al., 2010, Gilleece, 2012, Perkins, 2012, OECD, 2010, Mullis et al., 2012, Schulz et al., 2009) have emphasised the relationship between student achievement and home backgrounds which, amongst other consequences, makes valid comparative analysis between schools very difficult in Ireland.

Some examples of school processes include

- Curricular variety
- Assessment (diagnostic, formative, summative, national)
- Instructional strategies
- Programmes offered
- Special education provision
- Parental involvement
- Co-curricular activities
- Extra-curricular/enrichment opportunities

Reviewing a combination of process and demographic data will indicate student participations in different programs and activities. It will also show the perceptions of various sub-groups of students regarding what the school has to offer. Scrutinising school-process data with student-learning data will show the differences school programs are making to student results. Adding demographic data will help determine which programs and processes work best for various groups of students. Combining with perception data will gain insights into the impact of programs on learning based on student perceptions of programs and processes. Research by Shen et al. (2010) found, firstly, student achievement data predominates to the detriment of other streams such as demographic and school process data. They also found the achievement data was used more for accountability purposes than formative improvement and, thirdly, different streams of data were rarely used together in order to achieve greater insight.

Appendix II

Post-Primary Online Database (P-POD)

Schools are required to submit an annual report to the Department of Education known as the October Returns. This, therefore, forms a baseline of the data all schools should have available to them. Since 2014 all post-primary schools are required to make their returns of students' through the Departments Post-Primary Online Database (P-POD). Schools can export their information within P-POD in spreadsheet format which makes it possible for schools to filter and manipulate the data for their own administrative purposes. Deployment of Teaching Resources (DTR) Returns (previously known as the September Returns) contain details of each teacher's timetable within the school as of the 1st September and are submitted through the same system.

School Details

- School Number
- School Year
- School Name
- School Address
- County Code
- STD Code
- Telephone Number
- Fax Number
- Principal's Name
- School Classification Set (for schools where instruction is given through the medium of Irish).
- Boarding Fee
- Day/Boarding/Mixed
- Boys/Girls/Mixed
- Subject Co-operation: School Number 1 (Where a school co-operates with another school in teaching subjects. Where the co-operation is inward only)
- Subject Co-operation: School Number 2 (If the outward co-operation school is involved)
- Approved for Computer Studies Certification (Y/N)
- Computer Studies Year (If Computer Studies Option of the Leaving Certificate Mathematics course is offered)
- Board of Management Indicator (Where the school is governed by a Board of Management,)
- E-Mail Address
- Web Address
- Name of the Chairperson of the Board of Management
- Telephone Number of the Chairperson of the Board of Management
- Health Board Area
- Trustees/Owners Names and Addresses:

Pupil Details

- Surname, Other Names
- Course/Programme Code
- Programme Year
- Sub-Programmes (PLC and Dispersed VTOS only)
- Roll Class
- Address Details
- County Code
- Date of Birth
- Sex
- Country of Birth
- Traveller Support
- Medical Card Information
- Application for Language Support
- Mother's Maiden Name
- Enrolment/Entry Date
- Pupil Number/PPSN
- Day/Boarder Indicator
- VTOS Indicator
- Repeat Leaving Cert. Indicator

- Repeat Leaving Cert. Fees Indicator
- Exam Entrant
- LCVP Indicator
- Repeat Year Indicator
- Exemption to Repeat Indicator (Date & Reason)
- Exemption from Irish (Date Granted)
- Left Early Indicator (Date Left & Destination)
- New Entrant Indicator
- (New Entrant Indicator) Source Code
- (New Entrant Indicator) Previous School No
- (New Entrant Indicator) ESF Location Code (PLC/Core VTOS only)
- (New Entrant Indicator) ESF Educational Attainment (Highest Educational Attainment) (PLC, Core VTOS and LCA Only)
- (New Entrant Indicator) LCA Location Code (Leaving Cert. Applied Only)

Deployment of Teaching Resources (DTR) (Timetabling) returns

- School Data
  - School Number
  - Period
- Teacher Data
  - Reference Number
  - Teacher Forename and Surname
  - Qualifications
  - Gender
  - Personal Public Service Number
  - Post of Responsibility
  - Capacity (Permanent, temporary, part-time etc)
  - Teacher Job-sharing
  - Long term absence (Maternity/Parental/Adoptive/Long Term Sick/Carers/Study Leave or Secondment)
  - Career Break
  - Other school (where shared with another school)
  - Last school (when new to a school)
- Non-class contact timetabled hours (teacher's timetabled activity that does not involve the direct instruction / supervision of class groups or which relates to the student body)
  - Home School Liaison
  - Guidance and Counselling
  - Remedial
  - Programme Coordination
  - Other (Where a teacher is timetabled for activities not included above eg: meetings)
  - Time-tabled hours in other schools
  - Day (total daily hours)
- Class contact timetabled hours (for each contact period and class group concerned)
  - Subject
  - Programme Code
  - Programme Year
  - Class size
  - Team teaching
  - Medium (Where a subject is being taught to a class group through the medium of Irish)

In addition schools are required to maintain a record (T1 form) with details of the working week, scheduled holidays and examinations.

Appendix III

School Self-evaluation Guidelines for Post-primary Schools (2012)

[Type here]

Appendix to School Self-evaluation Report: legislative and regulatory checklist (Pages 64-67)

Issue	**Relevant legislation, rule or circular**
Valid enrolment of students	M51/93
Time in school Length of school year (minimum of 167 days for all year groups) Length of school week (minimum of 28 hours for all year groups)	Circular M29/95
Standardisation of school year	Circular 034/2011
Arrangements for parent/teacher and staff meetings	Circular M58/04
Implementation of national literacy strategy	Circular 25/12
Implementation of Croke Park agreement regarding additional time requirement	Circular 025/2011
Development of school plan	Section 21 Education Act 1998
Guidance provision in secondary schools	Circular PPT12/05, Education Act 1998 (section 9(c))
Whole-school guidance plan	Section 21 Education Act 1998
Delivery of CSPE to all junior cycle classes	Circular M12/01 Circular M13/05
Exemption from the study of Irish	Circular M10/94
Implementation of revised in-school management structures	Circular M29/02, Circular 21/98, Circular 30/97, Circular 29/97
Limited alleviation on filling posts of responsibility for school year 2011/12	Circular 53/11
Parents as partners in education	Circular M27/91
Implementation of child protection procedures	Circular 65/11 Please provide the following information in relation to child protection

Issue	Relevant legislation, rule or circular
	• Number of cases where a report involving a child in the school was submitted by the DLP to the HSE • Number of cases where a report involving a child in the school was submitted by the DLP to the HSE and the school board of management informed • Number of cases where the DLP sought advice from the HSE and as a result of this advice, no report was made • Number of cases where the DLP sought advice from the HSE and as a result of this advice, no report was made and the school board of management informed
Implementation of complaints procedure as appropriate	Section 28 Education Act 1998 Please provide the following information in relation to complaints made by parents during this school year • Number of formal parental complaints received • Number of formal complaints processed • Number of formal complaints not fully processed by the end of this school year
Refusal to enrol	Section 29 Education Act 1998 Please provide the following information in relation to appeals taken in accordance with Section 29 against the school during this school year Number of section 29 cases taken against the school • Number of cases processed at informal stage • Number of cases heard • Number of appeals upheld • Number of appeals dismissed
Suspension of students	Section 29 Education Act 1998 Please provide the following information in relation to appeals taken in accordance with Section 29 against the school during this school year • Number of section 29 cases taken against the school • Number of cases processed at informal stage

Issue	**Relevant legislation, rule or circular**
	• Number of cases heard • Number of appeals upheld • Number of appeals dismissed
Expulsion of students	Section 29 Education Act 1998 Please provide the following information in relation to appeals taken in accordance with Section 29 against the school during this school year • Number of section 29 cases taken against the school • Number of cases processed at informal stage • Number of cases heard • Number of appeals upheld • Number of appeals dismissed

Policy	**Source**
Enrolment policy	Section 15(2)(d) of Education Act Equal Status Acts 2000-2011
Code of behaviour, including anti-bullying policy[2]	Circular M33/91 NEWB guidelines Section 23, Education Welfare Act 2000 Guidelines on Countering Bullying Behaviour, 1993, Circular M33/91 Equal Status Acts 2000-2011
Attendance and participation strategy[3]	Circular M51/93 Section 22, Education Welfare Act 2000
Health and Safety Statement	Health and Safety Act 2005 Section 20
Data protection	Data Protection Act 1988 Data Protection (Amendment Act) 2003
Special education needs policy[4]	Education Act (1998) Equal Status Acts (2000 to 2011), Education (Welfare) Act (2000), Education for Persons with Special Education Needs Act (EPSEN)5 (2004) Disability Act (2005)
Social, personal and health education(SPHE)/Relationships and sexuality education (RSE) policy	Circulars 37/2010, 23/2010, M27/08, M11/03, M22/00, M20/96, M4/95
Substance use policy	Department of Education and Skills Directive; guidelines issued to schools in 2002
Internet acceptable use policy	Department of Education and Skills Directive
Child Protection Policy	Circular 0065/2011

[2] Under the provisions of the Education (Welfare) Act (2000) (section 23) the school's code of behaviour should conform to the specifications stated.
[3] Under the provisions of the Education (Welfare) Act (2000) (section 22) the school's attendance strategy should conform with the provisions stipulated.
[4] Section 9 of the Education Act (1998) requires a school to "use its available resources" to identify and provide for the educational needs of those "with a disability or other special educational needs."
[5] The EPSEN Act requires that schools be inclusive of and provide an appropriate education for students with special educational needs.

Appendix IV

Documents Analysed

Organisational Documents

- Student Journals
- Teacher Diaries
- Pedagogical guides for teachers
- Policy Documents: Behaviour, Assessment, Progression
- Student and parent study guides
- School prospectus
- SEN guides
- Subject Schemes of work
- Promotional material (incl. powerpoint files)
- BOM Reports

School Planning Documentation

- School Self-Evaluation Reports
- School Improvement Plans
- School Planning Documents
- DEIS Planning Documents
- Literacy and/or Numeracy Planning/implementation Documents
- Subject and Whole School Reports

Assessment and Examination Data (printed records from the computer)

- Junior and Leaving Certificate Exam Spreadsheets
- Exam Analysis Spreadsheets
- House Examination Spreadsheets and Analysis
- Attendance Records

Appendix V

Observation of Data Analysis Process

The examples below are based on the practices observed in the schools and documents examined. The examples below were modified slightly because:

- Some terms may be easily misinterpreted so terms were substituted to provide consistency across the schools eg: Mark/ Grade
- Some documents contained typographic or calculation errors
- Names are substituted to ensure anonymity

The data was essentially analysed on computers and subsequently pages are printed out or a slideshow is designed to present the findings. In various scenarios, a broad range of data fields may be selected to contribute to the analysis and there are numerous ways in which information may be arranged. The models below therefore provide a basis for comparison and explanation of the practices in the various schools. In BOB, LEO, DAN and JOE most of the analysis discussed with the principals was based in MS Excel whereas with JOE-P it was partially analysed in ePortal and partly in Excel. In general, data was exported from ePortal to Excel, however, BOB-P, PAT-P, PAT-FG, ANN-FG and TOM-P often had separate files developed solely in Excel. TOM-P and PAT-P did not demonstrate the use of VSware or ePortal for analysis during this research process. None of the teachers in the Focus Groups were able to produce data that they had analysed themselves relating to their own classes.
Note:

- Worksheet is used to describe an analysis sheet done on ePortal or Excel.
- SAS: Standard Age Score

A. Baseline Data

BOB: Comparison of Entrance information (Similar in all other schools) (BOB: includes placing)

Field	**Student's Name**	**Class**	**Feeder School**	**STEN English**	**STEN Maths**	**Verbal SAS**	**Quantative SAS**	**Non-verbal SAS**	**Spatial SAS**	**Overall**	**Placing**
Variables	Surname, First name	Class name	Reference	Number 1-10	Number 1-10	Number 1-126+	Number 1-126+	Number 1-126+	Number 1-126+	Number 1-10	Ranking relative to number in the class

Table 5 Comparison of entrance information

Example: Comparison of Entrance information

Student's Name	Class	Feeder School	STEN English	STEN Maths	Verbal SAS	Quantative SAS	Non-verbal SAS	Spatial SAS	Overall	Placing
Adams, Mark	John 1	Ashford NS	5	3	89	80	88	90	87	53
Byrne, John	Mark 1	Ballybeg NS	7	7	110	118	111	115	114	5
Cole, James	Luke 1	St. Patricks	3	5	85	78	87	86	84	59
Duggan, Anne	Luke 1	St. Patricks	4	7	98	118	113	115	111	8
Egan, Michael	Luke 1	Ballymore	4	5	77	86	85	80	82	66
Glynn, Thomas	Mark 1	St. Patricks	3	6	97	102	82	78	90	50
Adams, Mark	John 1	Gaelscoil	7	7	102	99	105	86	98	32

Table 6 Example of comparison of entrance information

Examples of analysis: Comparison of Primary school STENs and Entrance scores, the relative position of students in different categories, implications of these values (Actual names of students are substituted with alternative names)

BOB: Analysis of CAT scores for school in comparison to National Averages
(Similar in TOM, JOE, PAT, ANN)

Description	Very Low	Below Average		Average			Above Average		Very High
SAS bands	**<74**	**74-81**	**82-88**	**89-96**	**97-103**	**104-111**	**112-118**	**119-126**	**>126**
National Average	**4%**	**7%**	**12%**	**17%**	**20%**	**17%**	**12%**	**7%**	**4%**
Verbal	12%	12%	14%	27%	19%	8%	3%	3%	3%
Quantitative	4%	14%	13%	18%	21%	18%	9%	1%	1%
Non-verbal	4%	8%	25%	18%	14%	21%	8%	3%	0%
Spatial	4%	14%	17%	21%	17%	14%	6%	0%	6%

Table 7 Analysis of CAT scores for schools in comparison to national averages

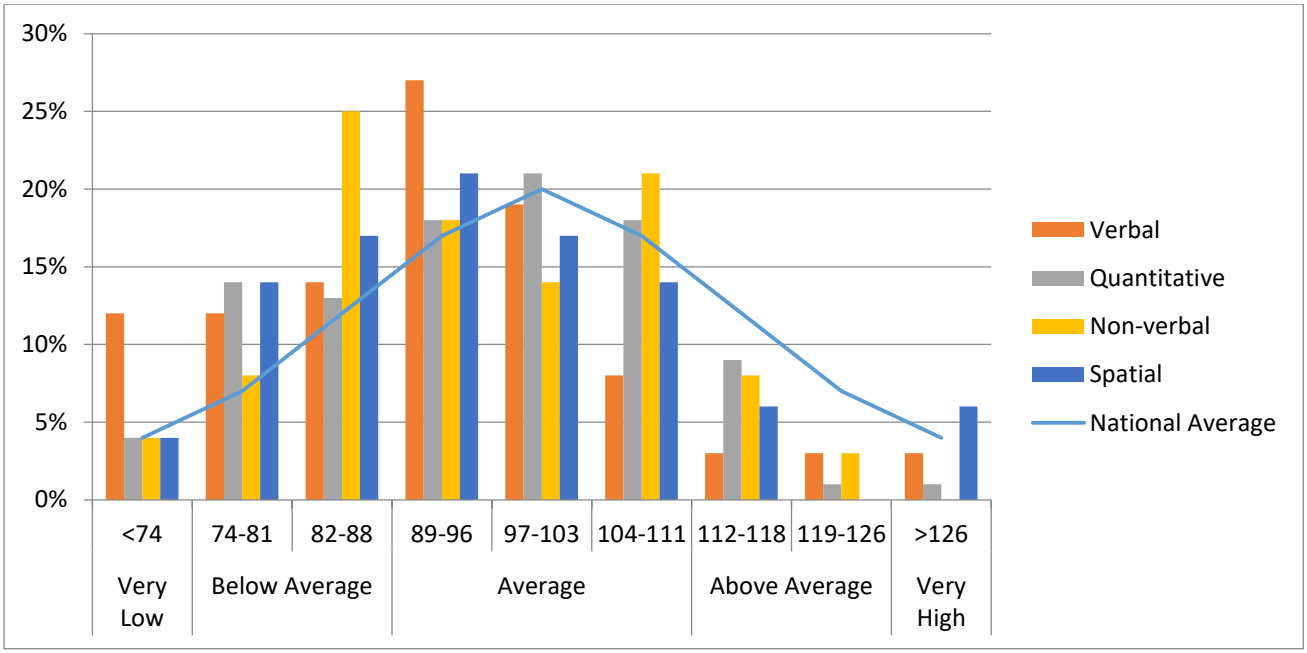


Figure 2 Analysis of CAT scores for schools in comparison to national averages

Examples of analysis: Considerations of few high performing students, variations in verbal and spatial scores and implications in forming classes and planning lessons

TOM: Comparison of entrance information

STEN scores from feeder primary schools

English Reading Compared with National Norm

Group	Below 70	70 - 79	80 - 89	90 - 109	110 - 119	120 - 129	130 and above	*Total*	Number of pupils		*Total enrolment*
	Very low	Low	Low average	Average	High average	High	Very high		excluded	absent	
1st Year	*5*	*3*	*11*	*18*	*1*	*0*	*0*	*38*	*0*	*0*	*38*
%Total Year 1	*13.2%*	*7.9%*	*28.9%*	*47.4%*	*2.6%*	*0.0%*	*0.0%*		*0.0%*	*0.0%*	*100%*
% Total (Norm)	*2%*	*7%*	*16%*	*50%*	*16%*	*7%*	*2%*				

Table 8 STEN scores from feeder primary schools

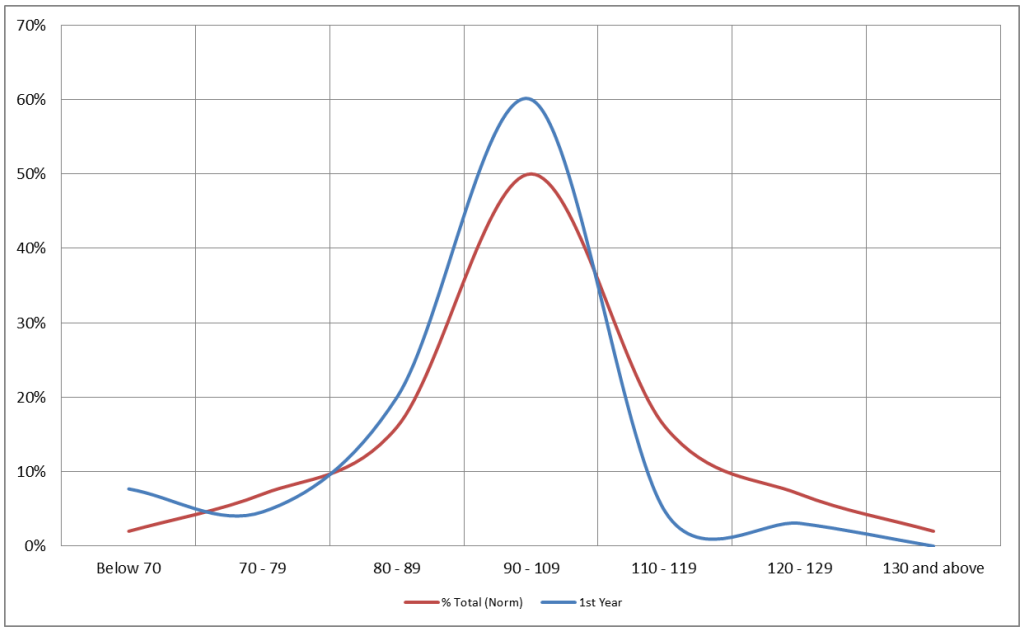


Figure 3 STEN scores from feeder primary schools compared to national averages

CAT Standardised Scores

Test 2	Mathematics	Date Administered	22/10/2013	Administered by:	Ms. Connolly

Group	Below 70	70 - 79	80 - 89	90 - 109	110 - 119	120 - 129	130 and above	Total	Number of pupils		Total enrolment
	Very low	Low	Low average	Average	High average	High	Very high		excluded	absent	
1st Year	5	3	13	39	3	2	0	65	0	0	65
%Total Year 1	7.7%	4.6%	20.0%	60.0%	4.6%	3.1%	0.0%		0.0%	0.0%	100%
% Total (Norm)	2%	7%	16%	50%	16%	7%	2%				

Table 9 Standardised CAT scores: mathematics compared with national norm

CAT Standardised scores: Mathematics Compared with National Norm

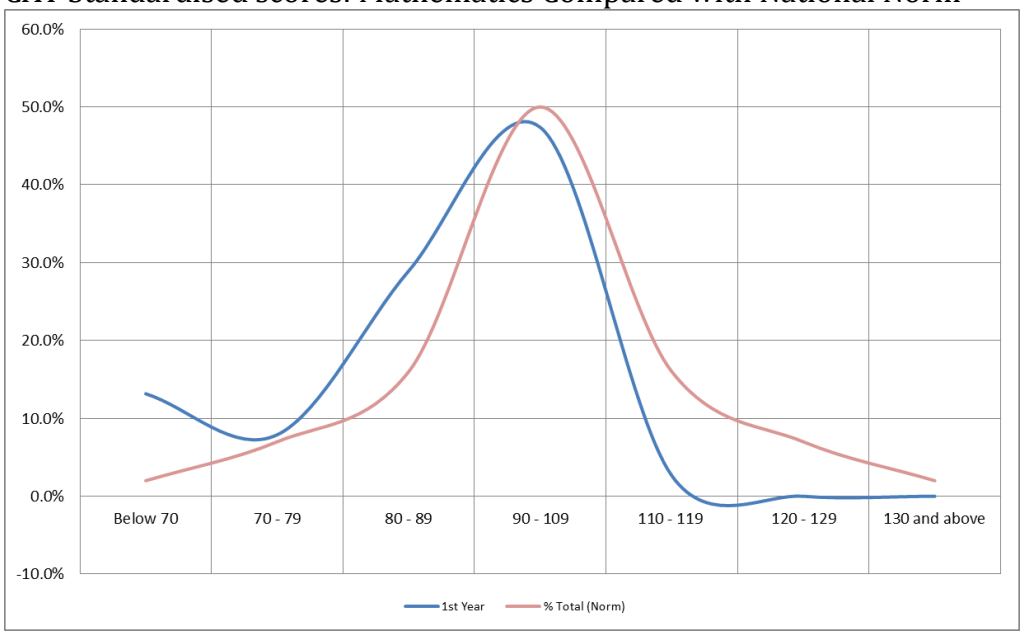


Figure 4 Standardised CAT scores: mathematics compared with national norm

Example of analysis: Implications of very few high performing students, large number in 'Low' and 'Average' categories, disproportional number in 'Very Low' category for lesson planning and target setting for exams, challenge to set high expectations for all students

B. Tracking

LEO: Entrance information used in tracking (Similar in BOB, JOE, DAN)

Field	Surname	Name	Class	Feeder School	Gender	Language	Verbal	Num	Non-verbal	English	Maths	Xmas	May	Dec
Variable	Surname	First name	Base class assigned	Feeder Primary School	Male Female	Spanish German French	Number 1-100	Number 1-100	Number 1-100	Number 1-10	Number 1-10	Formula ESRI points	Formula ESRI points	Formula ESRI points

Table 10 Entrance information used in tracking

(LEO: Classes formed based on language chosen, list sorted by Dec results)

Surname	First name	Class	Feeder School	Gender	Language	Verbal	Num	Non-verbal	English	Maths	Dec	May	Dec
Hayden	Jack	Hyde	St. Patricks	Male	Spanish	78	82	80	10	10	104	103	106
Sexton	Jill	O'Kelly	St. Marys	Female	German	86	97	90	7	9	107	103	106
Horan	Áine	Childers	Gaelscoil	Female	French	87	87	70	8	9	103	106	106
Doyle	Rory	Hyde	St. Patricks	Male	Spanish	95	89	99	10	10	105	103	105
Kinsella	Fergus	Childers	St. Patricks	Male	French	97	89	90	8	10	109	102	105
Daly	Colin	Hyde	St. Marys	Female	Spanish	55	89	74	7	8	107	105	105

Table 11 Example of entrance information used in tracking

Example of analysis: the nature of mixed ability in different classes, comparison of term results with each other and with entrance SAS

JOE: Examining individual student performance (similar in BOB)

Field	Student Name	Subject	Level	Assessment	Mark	Grade	Comment
Variables	SURNAME, First name	List of subjects	Ard	Junior Cert	Values 1 - 100	A	Free text
			Gnáth	Term exams x 4		B	
			Bun			C	
						D	
						E	
						F	
						NG	

Table 12 Examining individual student performance

(JOE: Filter used to sort list by Student Name; Grade generated automatically from Mark)

Student Name	Subject	Level	Assessment	Mark	Grade	(Placing in subj)
KELLY, Mary	English	G	Junior Cert	61	C	
KELLY, Mary	Irish	G	Junior Cert			
KELLY, Mary	Mathematics	A	Junior Cert	56	C	
KELLY, Mary	Technical Graphics	G	Junior Cert	98	A	1
KELLY, Mary	History	A	Junior Cert	66	C	
KELLY, Mary	Geography	A	Junior Cert			
KELLY, Mary	Science	B	Junior Cert	60	C	
RYAN, Paul	English	A	Junior Cert	76	B	
RYAN, Paul	Irish	G	Junior Cert	69	C	

Table 13 Example of examining individual student performance

Example of analysis: Have teachers entered results correctly (No Bun in science), (no grade given in Geography as opposed to absence from Irish Exam)

JOE: Overview of class performance by subject and teacher (similar in LEO but without improving/disapproving indicators)

Field	Name	Year	Class code	Irish (Teacher A)(Level#)	Irish (Teachers B))(Level#)	English (Teacher A))(Level#)	English (Teachers B))(Level#)	Maths (Teacher A))(Level#)	Maths (Teachers B))(Level#)	French (Teacher A))(Level#)	French (Teachers B))(Level#)	History (Teacher A)(Level#)	History (Teachers B))(Level#)
Variable	SURNAME, First name	Year	Reference	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100	Values 1 - 100

Table 14 Overview of class performance by subject and teacher

Name	**Year**	**Class code**	**Irish (Teacher A)(Level A)**	**Irish (Teachers B))(Level G)**	**English (Teacher C))(Level A)**	**English (Teachers B))(Level G)**	**Maths (Teacher D))(Level A)**	**Maths (Teachers E))(Level G)**	**French (Teacher A))(Level A)**	**French (Teachers F))(Level G)**	**History (Teacher G)(Level A)**	**History (Teachers D))(Level G)**
ADAMS, Mark	1	B				↑75		↑78		↓52		
BYREN, John	1	A	→51			↑54	→54					
COLE, James	1	D		↑58	↑66			→52		↑99		
DUGGAN, Anne	1	A	↑75			50		↑88	↑88			
EGAN, Michael	1	A		↑90		↓37		↓31	↑51			→70
GLYNN, Thomas	1	C	↓18		→69			↓45		↑70		
HUGHES, Mary	1	B		↑76	↑55			↑45	→66			
JEFFERS, Maria	1	B		→85		→93	↓70		↑80			
KELLY, Mary	1	C		↓19	↑42			↑63		→42		

Table 15 Example of an overview of class performance by subject and teacher

Example of analysis: how are individual students (or groups of students) performing across the board, are results between teachers in a subject comparable, are certain teacher/subject results distorting overall averages, are there missing results

BOB: First Year tracking (similar in LEO, DAN, ANN, TOM and PAT)
Term results summary sheet: October, Christmas, March and Summer

Field	**Name**	**Class**	**Subject 1**	**Subject 2**	**Subject 3**	**Subject 4**	**Avg**	**Ranking**
Variable	Surname, First name	Class initial	Mark 1-100	Mark 1-100	Mark 1-100	Mark 1-100	Average of Subjects	Ranking relative to number in class

Table 16 First Year tracking

Term Results

Name	**Class**	**Irish**	**Engl**	**Hist**	**Geog**	**Fren**	**Art**	**Home**	**Metl**	**Busi**	**Wood**	**TG**	**Civi**	**Sci**	**Math**	**Mus**	**Avg**	**Ranking**
Adams, Mark	J	52	70	49	49	67	51	40	0		70	65	50	60	55	90	**54**	**74**
Byrne, John	M	75	80	92	79	96	100	95	60	96	80	85	83	95	95	93	**86**	**4**
Cole, James	L	57	58	44	55	60	49	40	60	100	70	60	50	30	57	83	**58**	**71**
Duggan, Anne	L	40	66	44	79	85	51	95	70	100	60	90	50	37	69	90	**68**	**47**
Egan, Michael	L	79	60		52	88	94	40	100	100	50	60	50	28	34	92	**66**	**56**
Glynn, Thomas	M	60	55	52		40	63	95	70	46	80	55	67	60	100	72	**65**	**58**
Adams, Mark	J	64	70	65	73	100	51	55	60	92	75	85	65	80	70	93	**73**	**31**

Table 17 Example of First Year tracking

BOB: Review of performance in April-May (Cell shading generated automatically from a negative result)

Field	Student's Name	Class	CAT Placing	Placings Oct Assessment	Placings Christmas Assess	Placings March Assess 2015	Difference between CAT and March Placings
Variables	Surname, First name	Class name	Ranking relative to number in the class	Ranking relative to number in the class	Ranking relative to number in the class	Ranking relative to number in the class	Subtraction Formula

Table 18 Review of performance in April-May

Student's Name	Class	CAT Placing	Placings Oct Assessment	Placings Christmas Assess	Placings March Assess 2015	Difference between CAT and March Placings
Adams, Mark	John 1	53	74	68	69	-16
Byrne, John	Mark 1	5	4	4	15	-10
Cole, James	Luke 1	59	71	76	77	-18
Duggan, Anne	Luke 1	8	47	17	6	2
Egan, Michael	Luke 1	66	56	63	74	-8
Glynn, Thomas	Mark 1	50	58	59	66	-16
Adams, Mark	John 1	32	31	31	20	12

Table 19 Example of a review of performance in April-May

Example of analysis: Are there patterns to students' improvement/decline over the course of the year, how are students performing in relation to their entrance scores, are there subjects that students are excelling/faltering in.

BOB: Second Year (sorted by placement in March) in relation to entrance scores (similar in JOE and LEO, without placement)

Field	Name	Maths Age	Reading Age	STEN Maths	STEN English	CAT Placing	Placing Christmas Assess 2013	Placing March Assess 2014	Placing Summer Assess 2014	Placing October Assess 2014	Placing Christmas Assess 2014	Placing March Assess 2015	Diff between CAT placing and March Assess
Variable	Surname, First name	Number	Number	Number 1-10	Number 1-10	Number relative to number in the class	Number relative to number in the class	Number relative to number in the class	Number relative to number in the class	Number relative to number in the class	Number relative to number in the class	Number relative to number in the class	Number from Subtraction

Table 20 Second Year review of performance

	Maths Age	Reading Age	STEN Maths	STEN English	CAT Placing	Placing Christmas Assess 2013	Placing March Assess 2014	Placing Summer Assess 2014	Placing October Assess 2014	Placing Christmas Assess 2014	Placing March Assess 2015	Diff between CAT placing and March Assess
Collins, Michael	10:10	14:03	9	8	10	2	1	1	1	1	1	9
Higgins, Tom	12:08	15:00+	8	9	3	4	3	4	2	2	2	1
Smith, Grace	11:06	14:03	7	7	11	3	8	3	6	3	3	8
Mooney, Joe			7	7	7	1	2	2	3	4	4	3
O'Reilly, David			6	6	14	16	31	14	15	5	5	9
Kent, Margaret	15:00	15:00+	10	8	1	10	7	5	8	6	6	-5

Table 21 Example of Second Year review of performance

Example of analysis: are high achievers consistently achieving at their best, do low achievers show signs of improvement, are weaknesses in literacy/numeracy manifest in subject results (Missing information for Money and Reilly who joined school late)

BOB: Fifth Year Tracking across subjects

	1			**2**			**3**			**4**			**48**			**52**			
	Subject 1			**Subject 2**			**Subject 3**			**Subject 4**			**Subject..**			**Subject..**			
	L	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***Total***
First name Surname	Level	Grade	Equivalent Points	Level	Grade	Equivalent Points	Level	Grade	Equivalent Points	Level	Grade	Equivalent Points	Level	Grade	Equivalent Points	Level	Grade	Equivalent Points	Formula: sum of points

Table 22 Fifth Year Tracking across subjects

Underneath this table were the totals terms of number of students and percentage for each subject

Ordinary	Ordinary A	Higher A	Foundation A
Higher	Ordinary B	Higher B	Foundation B
Foundation	Ordinary C	Higher C	Foundation C
Total	Ordinary D	Higher D	Foundation D
	Ordinary E	Higher E	Foundation E
	Ordinary F	Higher F	

L: Level, G: Grade, P: Points

	Irish			**English**			**Maths**			**History**			**Geography**			**Art**			**Construction**			***Total***
	L	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	***L***	***G***	***P***	
Adam Farrell	G	D	15	A	D	55	G	C	30	G	B	45	G	B	45				A	C	70	**505**
Adrian O'Brien				G	A	60	G	B	45	G	B	45	G	B	45	G	C	30	A	C	70	**480**
Aiden Kingston	A	D	55	A	D	55	G	C	30	A	E	0	A	D	55							**590**
Amy Hickey	A	C	70	A	A	100	A	A	100	A	A	100	A	A	100	A	A	100				**970**
Andrew English				G	B	45	B	C	30	G	C	30	G	D	15				A	D	55	**290**
Anthony Condon	G	C	30	A	D	55	G	B	45	A	D	55	A	D	55	A	C	70				**515**

Ordinary	43	64%		22	27%		44	53%		32	39%		28	35%		22	52%		7	33%		
Higher	24	36%		56	67%		30	36%		51	61%		51	65%		20	48%		14	67%		
Foundation	0	0%		5	6%		9	11%														
Total	67			83			83			83			79			42			21			

Table 23 Example of Fifth Year review of performance

Example of Analysis: What is the general performance of students, what students are in difficulty, what subject areas are results low
BOB: Term tests Fifth Year: October, Christmas, March & Summer. Sixth Year: October and Christmas (6 in total) (similar in LEO, DAN, ANN, TOM, PAT)

BOB: Review of results and target setting, Autumn of Sixth Year (Similar in LEO and JOE)

Name	Iris	Engl	Hist	Geog	Fren	Phys	Chem	Agri	Biol	Engi	Cons	Acco	Busi	Art	Ente	Ho.Ec	Desi	Math	Avg
Ahern, John	78	55		68					24			92	68		75			67	**65**
Allen, Joe	76	70			75		67		60			53			65			54	**65**
Bradly, Patrick		0									45				60				**35**
Buckley, Kevin	55	57		35								84	49	42				56	**54**
Browne, Kevin	40	40						84		89	65				45		75	29	**58**
Casey, Jenny	54	38						74	44		50					79		59	**56**
Clarke, Sonya	37	45	29	47							45							51	**42**
Cronin, Olive	95	88					95	95	90						90	98		98	**93**
Average	**65**	**54**	**42**	**66**	**68**	**63**	**68**	**77**	**46**	**61**	**58**	**69**	**60**	**57**	**66**	**74**	**62**	**56**	

Table 24 Example of Sixth Year review of results

Name	*CAT Results Placing*	*Points for Summer 5th Year*	*Points Required for the Leaving Cert*	*Difference between Summer points and aspiration*	*Course Required*
Ahern, John	28	350	365	-15	Social Care
Allen, Joe	10	420			Not Sure
Bradly, Patrick	43	80	N/A		
Buckley, Kevin	60	160	365	-80	Social Care
Browne, Kevin	14	375			Not Sure
Casey, Jenny	53	330			
Clarke, Sonya	68	125	250	-105	Culinary Arts/Policing Studies
Cronin, Olive	7	625	520	105	Biomedical Science UCC

Table 25 Sixth Year review of results and target setting

Example of analysis: Are desired LC points realistically achievable, have students considered range of courses, do student have realistic understanding of the exams and their own abilities, are students feeling undue pressure or are students unfocused, how much consideration have been given to career choice and discussions with Career Guidance Counsellor and parents, what study plans have students in preparation for exams, are students realistic about what grades they can achieve in their various subjects

BOB: Post Mock Leaving Certificate Exam Review (Similar in LEO and JOE)

Name	*Points Placing at Junior Cert*	*Entrance Placing*	*CAT Results Placing*	*Points October Assessment 2014*	*Placing October Assessment 2014*	*Points Christmas Assess 2014*	*Placing Christmas Assess 2014*	*Points Pre Exams 2015*	*Placing Pre Exams 2015*	*Points Required*	*Points to spare or short of points*	*Difference between CAT results and Pre Assess 2014*
Ahern, John	**44**	69	28	360	31	235	36	200	35	365	-165	7
Allen, Joe	**15**	23	10	440	14	425	10	430	7	435	5	-3
Buckley, Kevin	**61**	78	60	170	49	125	46	115	45	365	-250	-15
Browne, Kevin	**31**	33	14	420	19	325	21	340	16	340	0	2
Casey, Jenny	**39**	55	53	375	28	320	22	290	23		290	-30
Clarke, Sonya	48	62	68	165	51	80	52	80	50	250	-170	-18
Cronin, Olive	**1**	7	7	545	2	580	1	480	3	520	-40	-4

Table 26 Post Mock Leaving Certificate Exam Review

Example of analysis: Are students meeting expectations as per their entrance scores, how is the mock exam comparable with the term exams, do the mock and term results indicate students should consider changing levels, what students are under/over performing in the mock exam in relation to the term exams, what students need to reconsider their aspirations in light of exam results. (Students usually under-preform in the Mock examinations JOE-P and BOB-P)

C. Exam Review

LEO: Review of Junior Certificate English

Higher Level

Grade	Total	College %	National %
ABC	161	85%	76%
D	30	15%	22%
Fail	0	0%	2%

Ordinary Level

Grade	Total	College %	National %
ABC	12	100%	79%
D	0	0%	19%
Fail	0	0%	2%

English	A	B	C	D	E	F	NG
Hon 2014	21	61	79	30	0	0	0
(2013)	(40)	(86)	(54)	(10)	(1)	(0)	(0)
Ord 2014	1	8	3	0	0	0	0
(2013)	(0)	(1)	(9)	(2)	(0)	(0)	(0)

Percentage taking Higher Level Papers 2004-14

English	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
College	83	83	85	82	90	83	84	82	90	94	94%
National	63	65	65	66	66	67	68	70	71	73	75%

Percentage Achieving ABC Grades on Higher Level Papers

English	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
College	83	71	88	81	89	85	89	69	86	94	85%
National	77	76	78	77	78	77	77	77	76	75	76%

Table 27 Review of a Junior Certificate subject

Example of analysis: there was an exceptionally able group in 2013 who performed exceedingly well, 2014 results are similar to 2012, there is a steady increase in those taking HL papers from 2004, the Subject Department is performing consistently well against national averages

PAT: Review of Leaving Certificate Art (similar in all schools)

	Among School Cohort/Nation			*Within each level*		
	Cohort	Nation	Difference	Group	National	Difference
Taking Higher Level	67%	74%	-7%			
Taking Ordinary Level	33%	26%	7%			
HL A	42%	17%	25%	62%	22%	40%
HL B	23%	23%	0%	34%	32%	2%
HL C	2%	26%	-23%	3%	35%	-31%
HL Honours	67%	66%	2%	100%	89%	11%
HL D (Pass)	0%	8%	-8%	0%	10%	-10%
HL Fail	0%	0%	0%	0%	1%	-1%
OL A	14%	3%	11%	43%	13%	30%
OL B	12%	8%	4%	36%	31%	5%
OL C	7%	9%	-2%	21%	33%	-12%
OL Honours	33%	20%	13%	100%	76%	24%
OL D (Pass)	0%	4%	-4%	0%	17%	-17%
OL Fail	0%	2%	-2%	0%	7%	-7%

Table 28 Review of a Leaving Certificate subject

Example of analysis: Perhaps some of the 14% OL A could have been convinced to pursue HL, need to examine why 2% who Failed

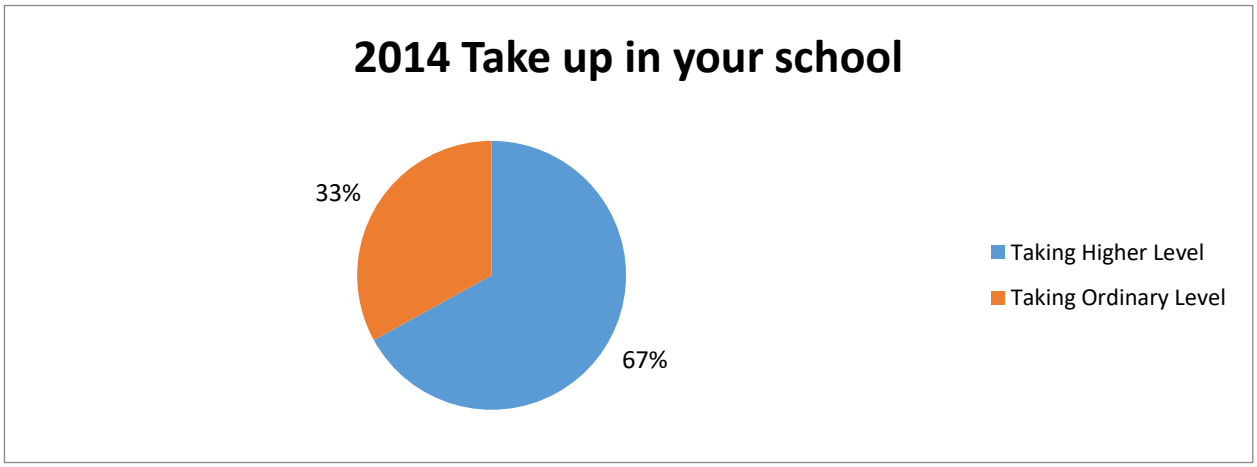
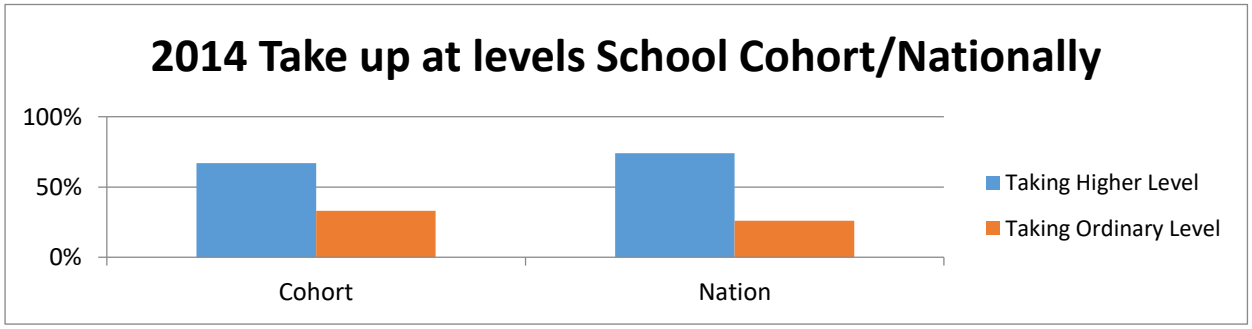


Figure 5 Review of a Leaving Certificate Subject



PAT: Review of Leaving Certificate English over five years (similar in all schools)

Students studying this subject in the school/Nation

	2014		2013		2012		2011		2010	
	Cohort	Nation	Cohort	Nation	Cohort	Nation	Cohort	Nation	Cohort	Nation
Taking Higher Level	64%	67%	56%	65%	53%	65%	56%	65%	53%	64%
Taking Ordinary Level	36%	33%	44%	35%	47%	35%	44%	35%	47%	36%
HL A	5%	6%	4%	6%	3%	6%	4%	7%	3%	7%
HL B	21%	18%	11%	17%	16%	17%	11%	17%	16%	17%
HL C	28%	27%	15%	26%	18%	26%	15%	26%	18%	25%
HL Honours	53%	51%	30%	50%	37%	50%	30%	50%	37%	49%
HL D (Pass)	10%	15%	12%	13%	11%	14%	12%	14%	11%	14%
HL Fail	0%	1%	14%	1%	5%	1%	14%	1%	5%	1%
OL A	3%	2%	5%	3%	4%	3%	2%	3%	3%	3%
OL B	9%	10%	4%	10%	12%	10%	12%	11%	13%	12%
OL C	21%	13%	12%	14%	16%	14%	17%	13%	18%	14%
OL Honours	33%	25%	21%	26%	32%	26%	32%	27%	34%	29%
OL D (Pass)	3%	7%	10%	7%	11%	7%	7%	7%	8%	7%
OL Fail	0%	1%	14%	1%	5%	1%	5%	1%	5%	1%

Table 29 Review of Leaving Certificate Subject over five years

Example of analysis: The results have been remarkably consistent over five years, however, there was a big improvement in 2014 results including proportion taking HL, these results are not consistent with Junior Cycle results which are much more variable. These need to be reviewed in light of the Junior Cert equivalent three years ago.

BOB: Review of Junior Cycle Exam performance (Similar to LEO and JOE but Mean SAS at entrance is used)

	Points			Entrance Assessments			
Name	Total Pts	Points Placing Junior Cert	Placing	Verbal	Numerical	Total Reasoning	Place difference
Adam Hickey	505	54	45	35	18	24	-9
Adrian Murphy	480	59	58	32	5	13	-1
Aiden Fitzpatrick	590	45	38	58	12	30	-7
Amy O'Doherty	970	2	2	91	55	79	0
Andrea Flynn	290	79	76	6	6	5	-3
Anthony Coyle	515	52	30	45	35	37	-22
Anthony O'Shea	420	71	52	32	12	18	-19
Anthony Cunningham	420	72					
Brendan Manning	635	34	46	19	27	21	12

Table 30 Review of Junior Cycle Exam performance

Example of analysis: A. O'Shea and A. Cunningham both have the same points and are both on position 71, A. Coyle has considerable potential but is extremely lazy and is not working to his potential (and never has). Are students performing to their potential based on entrance and JC exam results, are there reasons for underperformance with some students that can be redressed.

TOM: Review of Junior Certificate results (proportion taking Higher Level) and targets for the subsequent years.

Junior Certificate

	Recent	Target
Subject	**2014**	**2015**
Home Economics	72%	68%
Gaeilge	22%	40%
Religion	78%	78%
History	32%	53%
Geography	62%	65%
English	42%	55%
Science	40%	75%
Art	68%	41%
Maths	14%	18%
Spanish	54%	76%
French	40%	56%
Business	42%	72%
Music	70%	70%

Leaving Certificate

	Recent	Target
Subject	**2014**	**2015**
Home Economics	68%	43%
Gaeilge	28%	13%
Religion	100%	80%
History	68%	44%
Geography	62%	61%
English	60%	55%
Art	68%	47%
Maths	4%	2%
Spanish	40%	20%
French	26%	29%
Business	44%	0%
Music	100%	100%
Accountancy	28%	0%
Chemistry	100%	40%

Table 31 Review of Junior Certificate results and targets for the subsequent years

Example of analysis: Current JC similar to last year but larger proportion of weak students in the well below average group (which do not tend to effect HL), the current Leaving Certificate class is much weaker than last year's LC group based on Entrance Scores and performance in the Junior Cycle.

TOM: Target setting Higher Level Grades

Field	**Subject**	**Teacher**	**Students**	**HL %**	**OL %**	**FL %**	**Predicted Grades**		
							# HL	# OL	# FL.
Variable	Subject	Teacher name	Number of students	Percentage currently at HL	Percentage currently at HL	Percentage currently at HL	A = B = C = D =	A = B = C = D =	A = B = C= D =

Table 32 Target setting Higher Level Grades

Subject	**Teachers**	**Students**	**HL %**	**OL %**	**FL %**	**Predicted Grades**		
						HL %	OL %	FL. %
Music	Teacher A	2	100	0	0	A= 0	A= 0	A= 0
						B= 1	B= 0	B= 0
						C= 1	C= 0	C= 0
						D= 0	D= 0	D= 0
Religion	Teacher H	15	80	20	0	A= 0	A= 0	A= 0
	Teacher I					B= 0	B= 0	B= 0
						C= 2	C= 3	C= 0
						D= 10	D=0	D= 0
History	Teachers J	16	43	57	0	A= 0	A= 1	A= 0
	Teacher K					B= 0	B= 0	B= 0
	Teacher L					C= 4	C= 4	C= 0
						D= 3	D= 4	D= 0

Table 33 Example of Target setting Higher Level Grades

Example of analysis: How much analysis of students prior performance have teachers undertaken to predict these grades, have teachers a tendency to under/overestimate student performance in the past

LEO: Review of Leaving Certificate results

Percentage taking Higher Level Papers (and Previous Year) compared to the National Average		
Higher Level	**College**	**National**
Gaeilge	52% (48%)	40%
English	86% (77%)	67%
Maths	34% (31%)	27%
French	56% (38%)	56%
German	50% (72%)	69%
Spanish	72% (60%)	64%
Geography	98% (84%)	78%
History	93% (82%)	70%

Percentage achieving ABC Grades on Higher level papers 2014 compared to the National Average		
Total number of students sitting HL papers in the college	**College**	**National**
95	69%	88%
165	77%	76%
65	53%	72%
50	68%	75%
2	100%	77%
71	69%	80%
94	82%	75%
41	92%	77%

Table 34 Review of Leaving Certificate results

LEO: Percentage achieving ABC Grades on Higher Level Papers 2004 – 2014
(Similar in JOE, BOB, PAT and ANN)

Subject	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Gaeilge	76	83	75	80	84	81	74	69	64	83	69%
English	85	81	86	67	67	83	73	83	84	84	77%
Maths	67	63	88	82	81	77	83	87	71	83	53%
French	68	66	66	78	64	78	62	78	95	85	68%
German	59	75	67	57	80	58	100	80	80	77	100 %
Spanish	38	44	71	100	95	100	84	75	87	88	69%
Geography	85	91	86	70	79	79	86	83	76	70	82%

Table 35 Percentage achieving ABC Grades over time

Example of analysis: how are subjects performing in relation to previous years, any patterns? Are there subjects consistently perform above/below the national averages,

LEO: Number of students by points achieved in Leaving Certificates 2004-2014
(Similar in BOB without National Averages)

Points	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	College %	National %
500 - 600	10	6	5	4	5	6	5	9	9	15	11%	9%*
400 - 499	30	23	26	25	23	24	30	30	23	25	33%	33%
300 - 399	31	28	36	24	34	31	34	31	32	26	34%	26%*
200 - 299	19	23	21	30	20	20	19	18	22	18	15%	17%*
100 - 199	6	12	11	10	12	14	9	9	10	13	7%	13%*
0-99	4	8	1	7	6	5	3	3	4	3	0%	10%*
Total	**189**	**210**	**152**	**171**	**194**	**216**	**164**	**186**	**180**	**181**		
Average Points	**356**	**310**	**335**	**312**	**317**	**317**	**339**	**352**	**338**	**353**	**371**	**322***

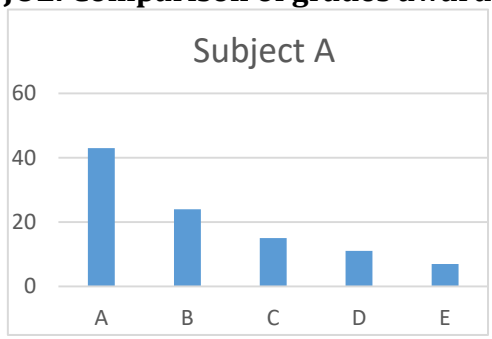
Table 36 Number of students by points achieved in Leaving Certificates over time

*Provisional at the time of analysis

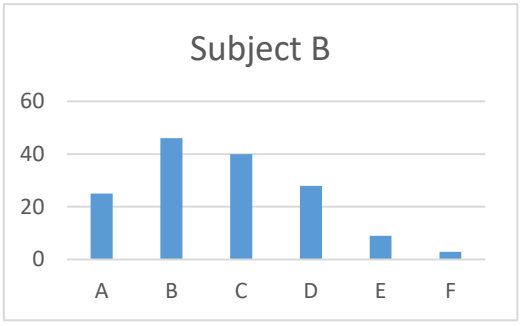
Are outcomes improving/disapproving, what subjects are consistently perform well, are students achieving the points they require,

D. Other Examples of Analysis

JOE: Comparison of grades awarded in a year group



Subject A	
A	60
B	43
C	24
D	15
E	11
F	7



Subject B	
A	12
B	46
C	31
D	18
E	9
F	3

Table 37 Comparison of grades awarded in a year group

Example of analysis: All classes are Mixed Ability so was the test in Subject A too easy, if more than one teacher in that subject was there common marking

TOM: Review of subject results

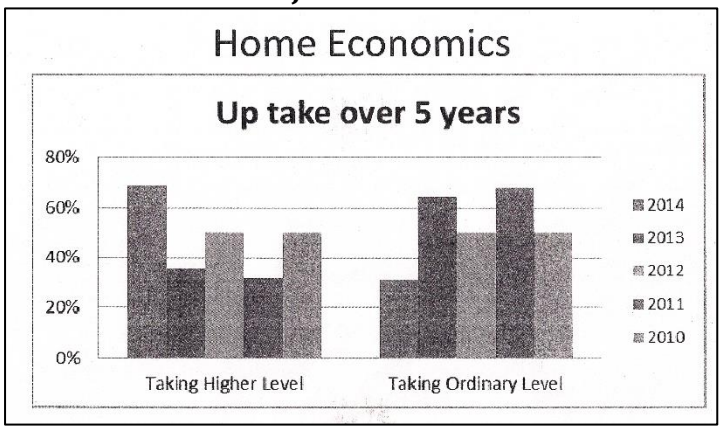


Figure 6 Review of a subject examination results

Example of analysis: Two teachers alternate, greater Subject Department collaboration is required to standardise student performance across years

PAT: Review of performance in maths over three years

	Percent	2012/13 1st Years	2013/14 2nd Years	2014/15 3rd Years
Excellent	95+	1%	1%	7%
Well above average	85-97	6%	7%	14%
Higher Average	75-84	5%	5%	11%
Age Appropriate (Average)	50-75	30%	22%	26%
Below Average (Concern)	26-49	37%	37%	21%
Lower Average (Concern)	16-25	8%	8%	14%
Weak (Concern)	0-15	13%	20%	7%

Table 38 Review of performance in maths over three years

Maths department plans and assessment based on a programme from the UK that facilitated tests in 1st, 2nd and 3rd year.

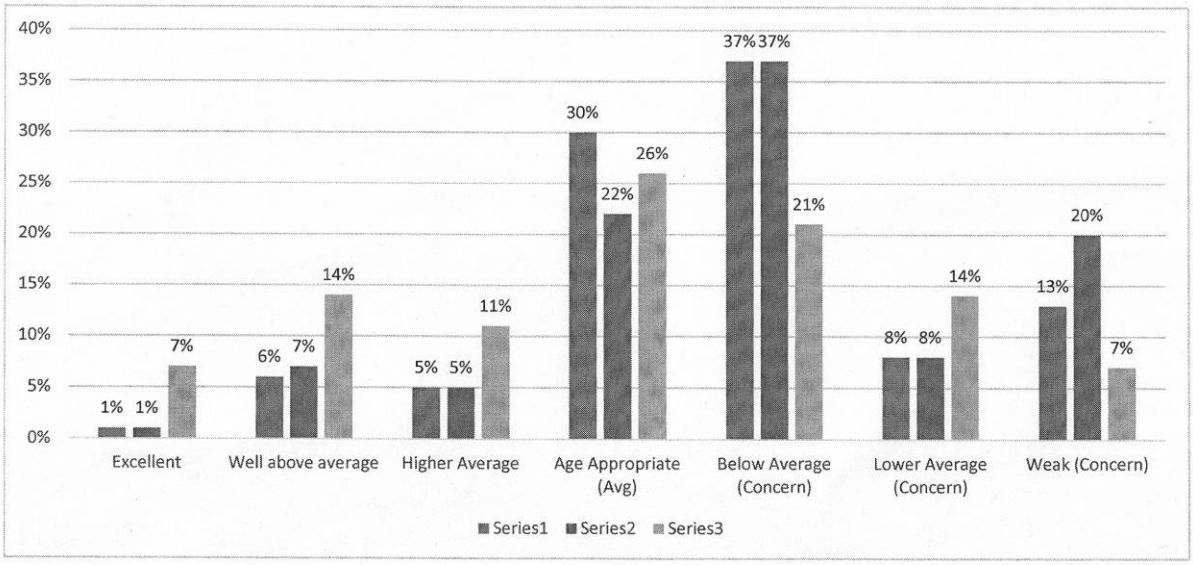


Figure 7 Review of performance in maths over three years

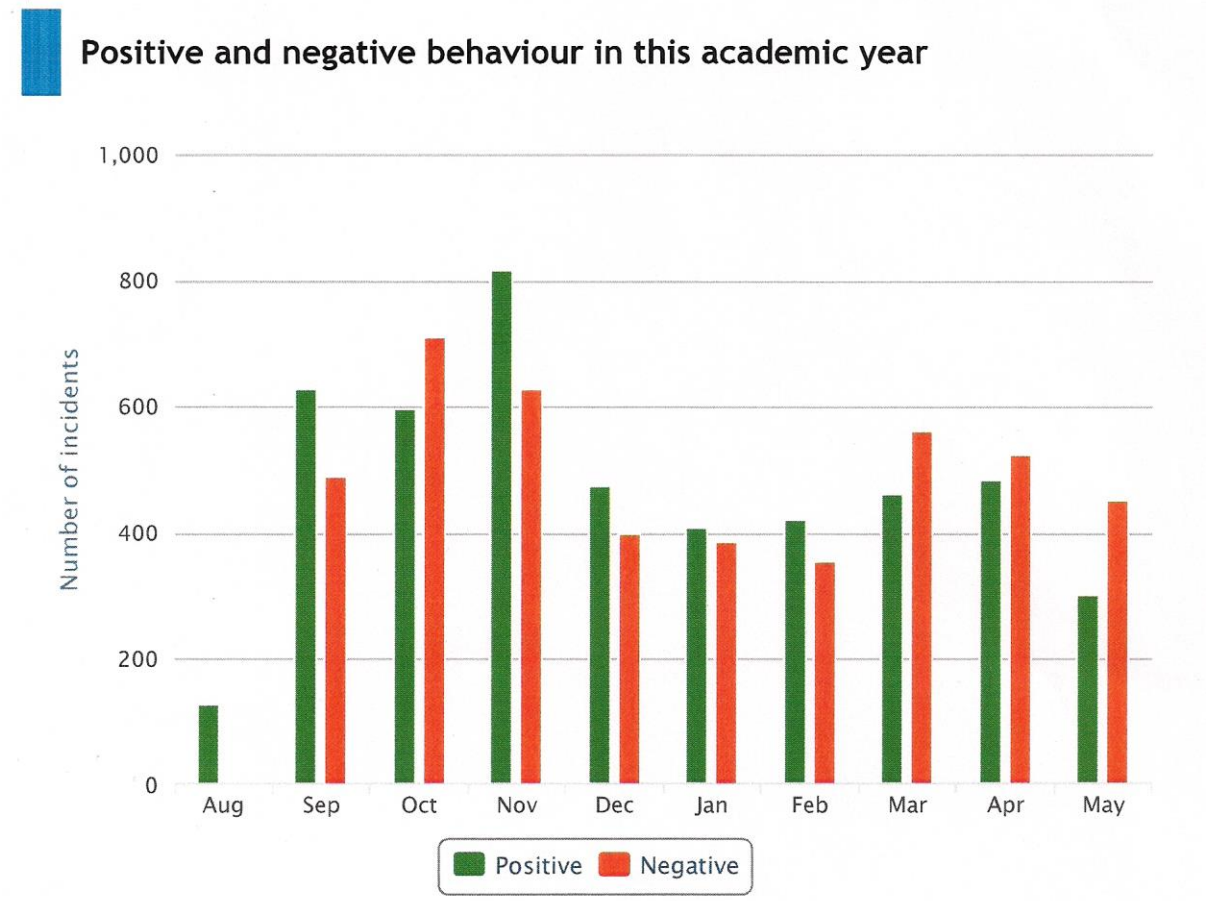
Example of analysis: Average and below average groups should make more progress over three years, what factors are influencing uneven distribution of results (better able out-performing in 3rd year)

ANN: Review of attendance in VSware (Similar in LEO and to a lesser extent in BOB)

Figure 8 Review of attendance in VSware

Example of analysis: The profile of the students/groups who are regularly absent, the characteristics do they share, Oct/Dec/Jan may be higher because there are less than four weeks in school, so perhaps by week would be more accurate, certain days (Mondays for Seniors), parts of the day (Wednesday mornings/Friday Afternoons) and time of year (before after Bank Holidays/towards the end of the year) are more problematic for some. Need to increase contact with parents.

ANN: Behaviour review



Example of analysis: Decline in positive comments as the year progresses,

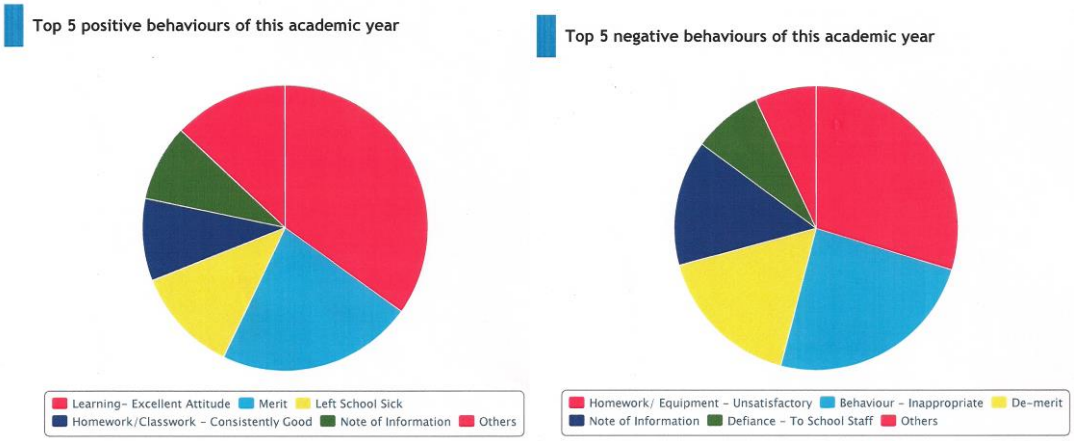


Figure 9 Review of behaviour over time in VSware

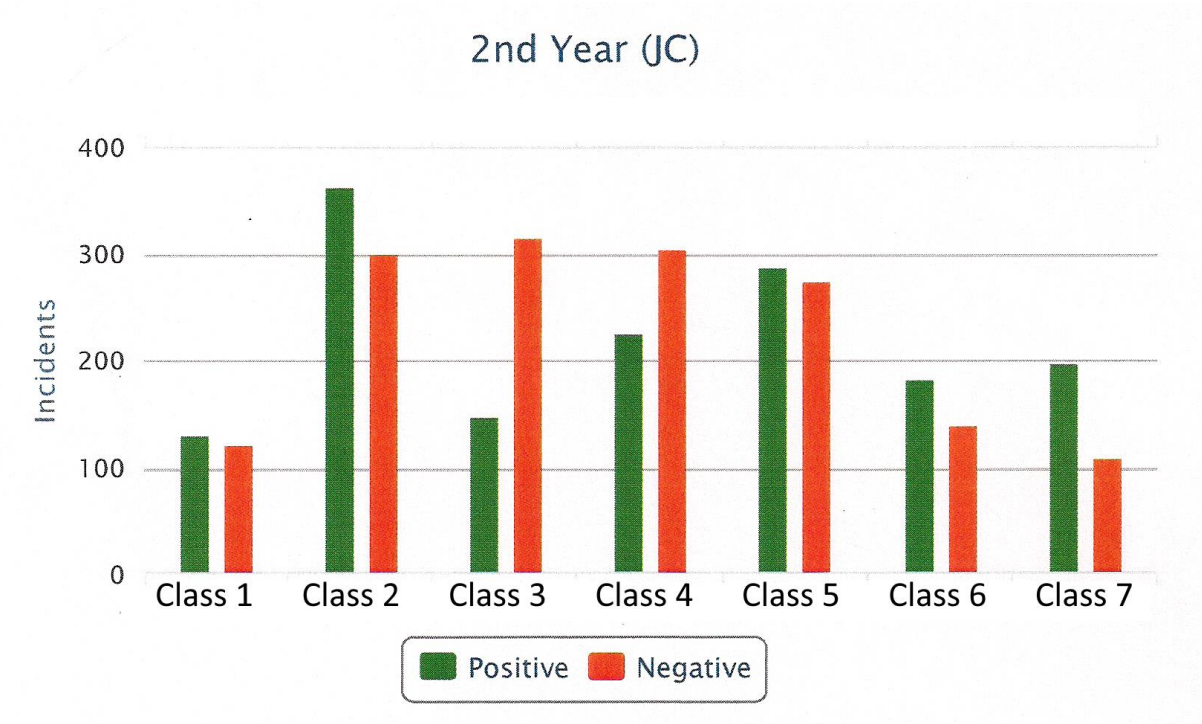


Figure 10 Review of behaviour between classes in VSware

Example of analysis: Similar number of indiscretions in classes 2,3,4 and 5 but teachers are not being consistent in giving out merit slips, classes 3 and 4 in particular, are there students in classes 2, 3, 4 and 5 that should be moved to other classes